

# SERVICE MANUAL

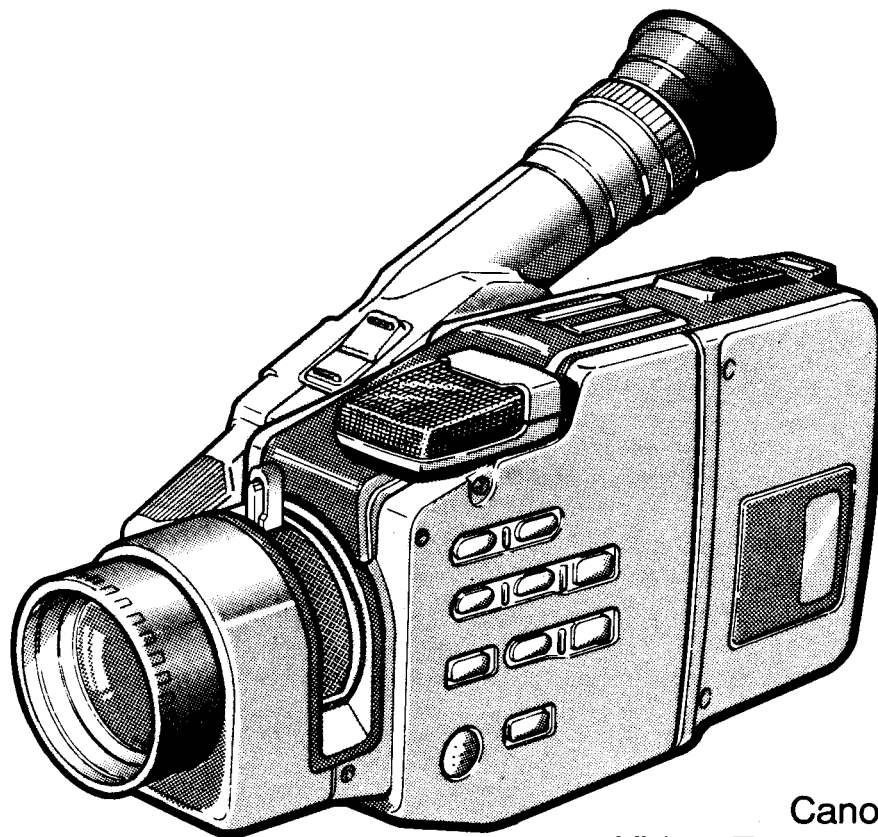
## E800HiE,F

(REF. NO. D15-2930,2970)

8mm Video Camera & Recorder

PAL

F-PAL



DY8-1152-930-000

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Canon Inc.  
Video Technical Service Dept.  
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## SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine CANON replacement parts.

Especially critical parts in the power circuit block should not be replaced with other makes.

Critical parts are marked with  $\triangle$  in the schematic diagrams.

2. The primary source of X-ray radiation in this viewfinder is the picture tube. The tube used in the viewfinder is especially constructed to limit X-ray radiation emission. For continued X-ray radiation protection, the replacement tube must be same type as the original, CANON approved one.
3. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
4. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
5. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

### 5-1 Leakage Current Cold Check

- 1) Unplug the AC cord and connect a jumper between the two prongs on the plug.
- 2) Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between  $1M\Omega$  and  $5.2M\Omega$ . When the exposed metal does not have a return path to the chassis, the reading must be  $\infty$ .

### 5-2 Leakage Current Hot Check

- 1) Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
- 2) Connect a  $1.5K\Omega$  10 watt resistor, paralleled by  $0.15\mu F$  capacitor, between each exposed metallic parts on the unit and a good earth ground such as a water pipe, as shown in the figure below.
- 3) Use an AC voltmeter, with  $1000\Omega/\text{volt}$  or more sensitivity, to measure the potential across the resistor.
- 4) Check all exposed metallic parts of the cover (Cable connection, Handle bracket, metallic cabinet. Screwheads, Metallic overlays, etc), and measure the voltage at each point.
- 5) Reverse the AC plug in the AC outlet and repeat each of the above measurements.
- 6) The potential at any point should not exceed 0.75V RMS.

A leakage current tester (FLUKE MODEL: 8000A equivalent) may be used to make the hot checks.

Leakage current must not exceed 0.5 milliamp.

In case a measurement is out side of the limits specified, there is a possibility of a shock hazard, and corrective action must be taken before returning the instrument to the customer.

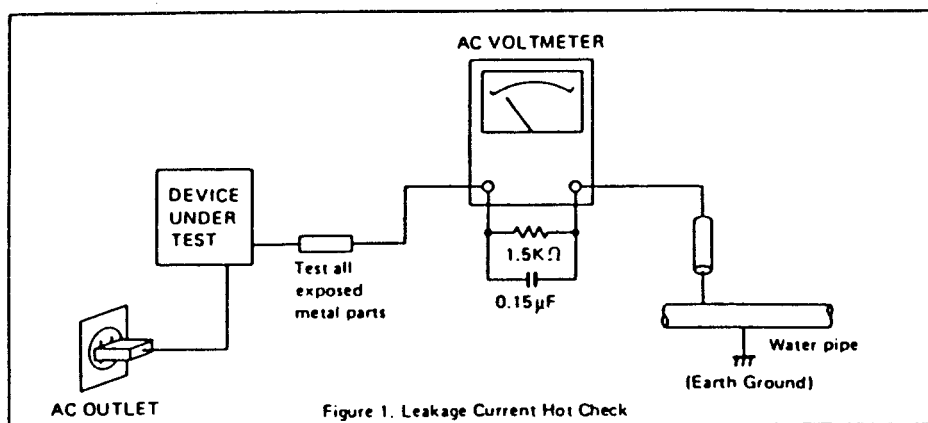


Figure 1. Leakage Current Hot Check

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### PREFACE

1. The model VCC858 is the same as the Canon model E800HiE except the external cover.
2. This service manual is the same as that for the model E800HiE except the Parts Catalog section.

## CHAPTER I. GENERAL DESCRIPTION OF PRODUCT

### 1. Product Overview

The model E800Hi is the second high-band 8 mm video camcorder having the TV-AF feature based on a fuzzy theory, 8x power zooming capability. The fuzzy-logic-based TV-AF feature is the most advanced auto-focusing implementation.

#### 1-1 Main features

##### (1) Innovative auto-focusing

- ° Fuzzy-logic TV-AF feature that lets the user feel comfortable and pleasant in videographing.
- ° Auto tracking capability allowing the user to exactly aim at the subject in scene.

##### (2) Superlative picture quality and sound quality

- ° Hi8 system
- ° CCD with 420,000 pixels
- ° High performance 8x zoom lens
- ° S video output terminal with Y/C separating function
- ° Center-weighted average metering and back light correction system using 5-zone multi pattern
- ° Full-auto white balancing with 25-area split evaluation system, auto knee circuit
- ° Hi-Fi FM stereo recording

##### (3) Versatile functionalities

- ° Twin macro-focusing at both the telephoto and wide-angle ends.
- ° Color character generation (eight colors) and digital superimposition
- ° High-speed shutter function (1/2000, 1/1000, 1/500, 1/250 sec)
- ° Quick search (28x fast drive : LP mode)
- ° Double-mode timer recording functions (self timer, interval timer)
- ° Stereo microphone

##### (4) Ease of use

- ° Multi-action grip with the electronic viewfinder mounted
- ° Wireless remote controller (WL-200)
- ° Sports finder (SF-200) standard-equipped

##### (5) Others

- ° Slimmer with the new recorder mechanism design (Approx. 10 mm slimmer than the conventional model)

## 1-2 External view and nomenclature

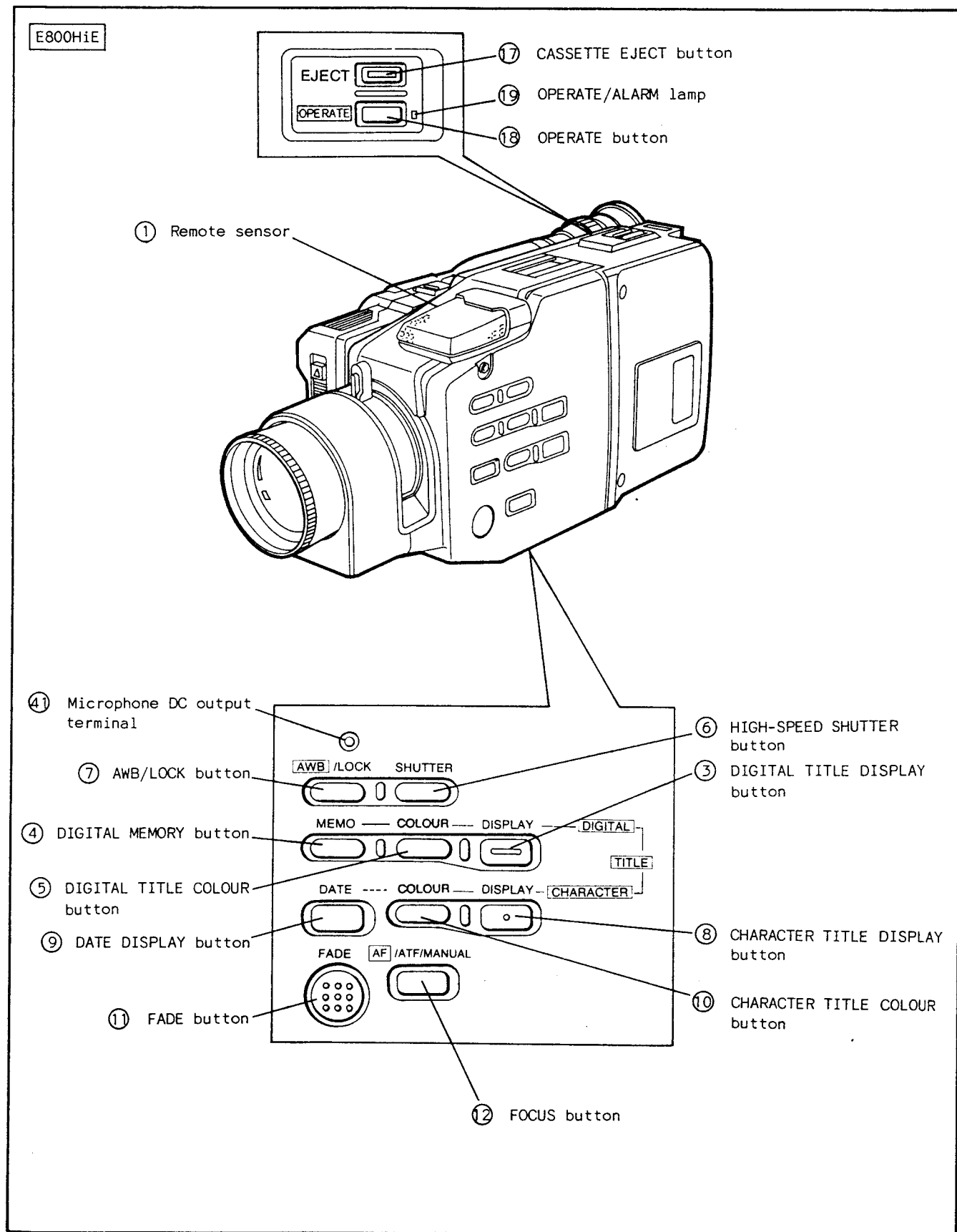


Fig. I-1

E800HiF

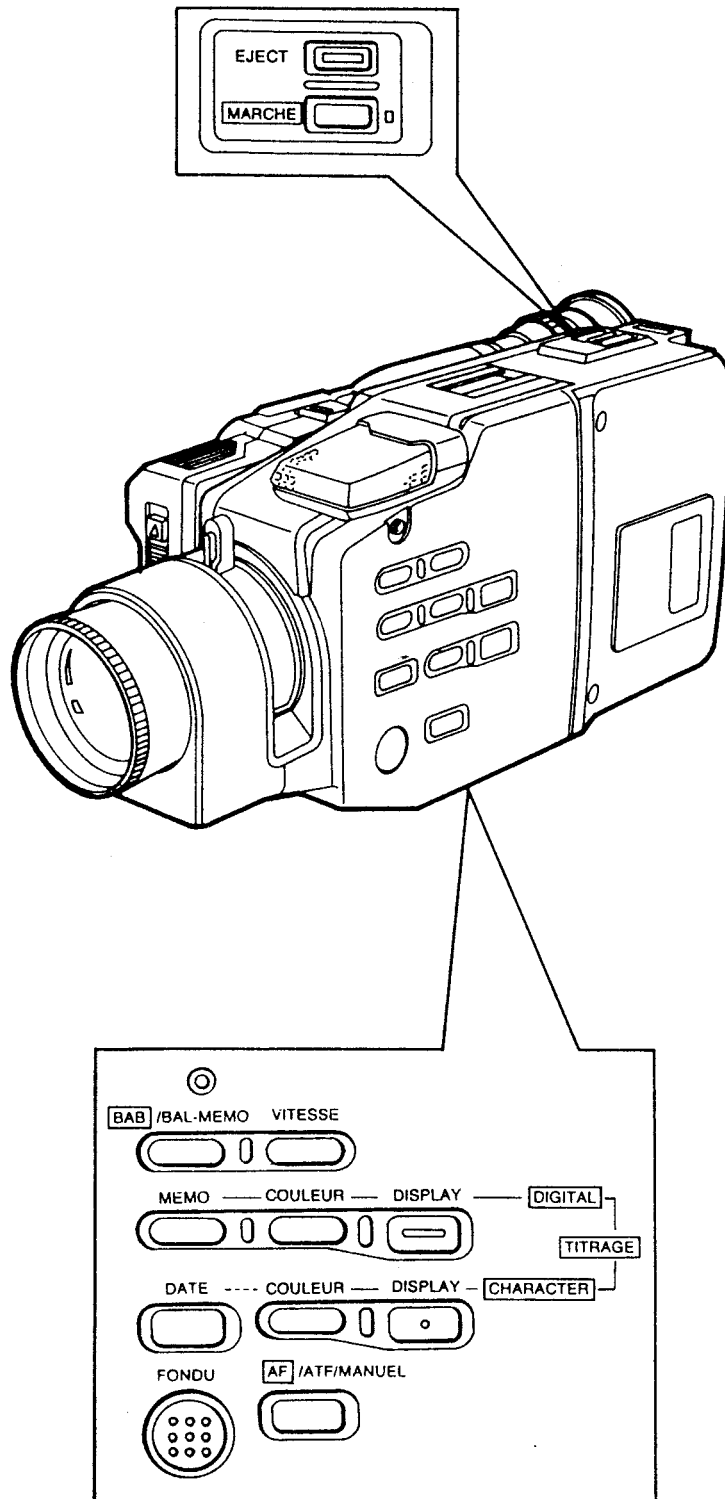


Fig. I-2



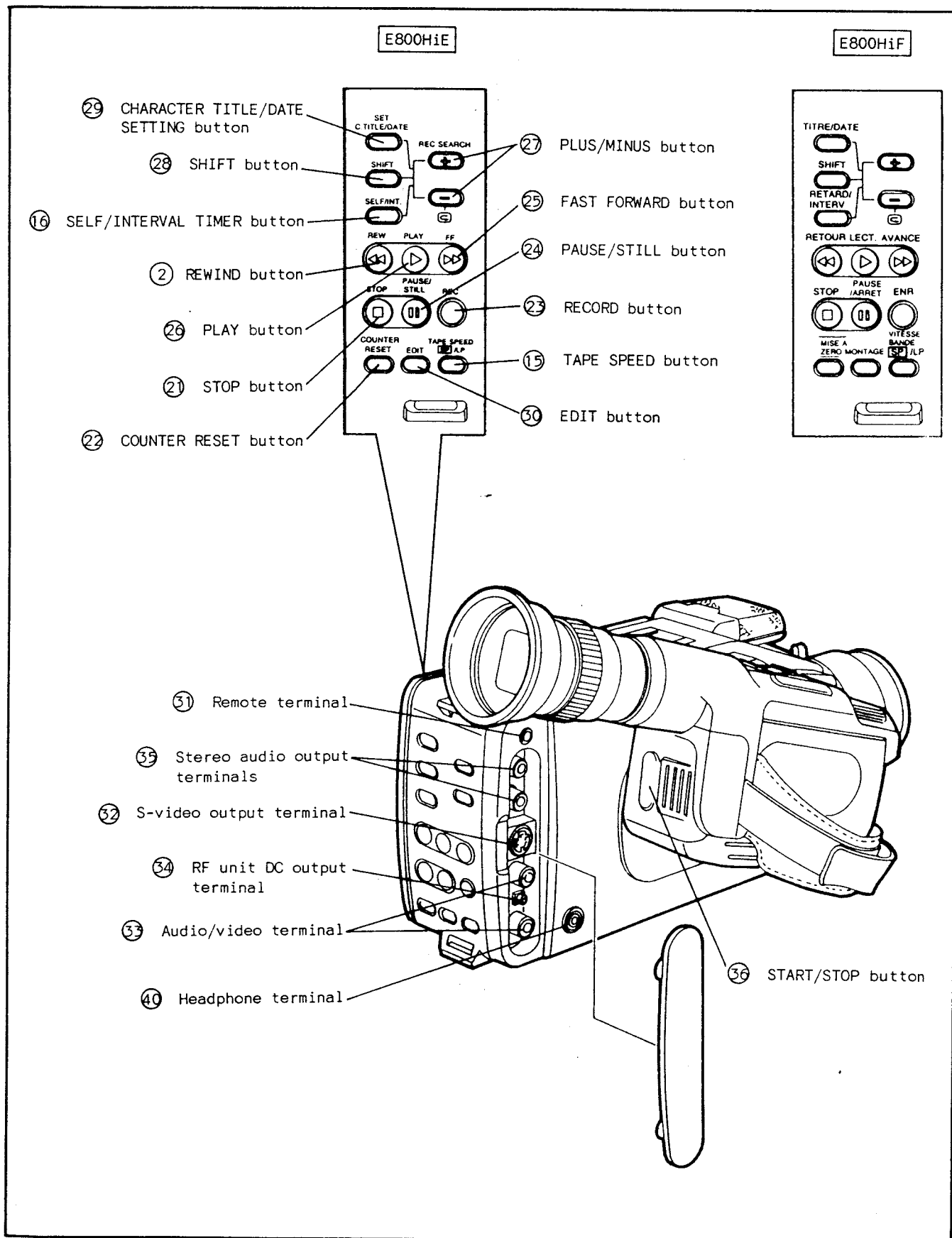


Fig. I-3

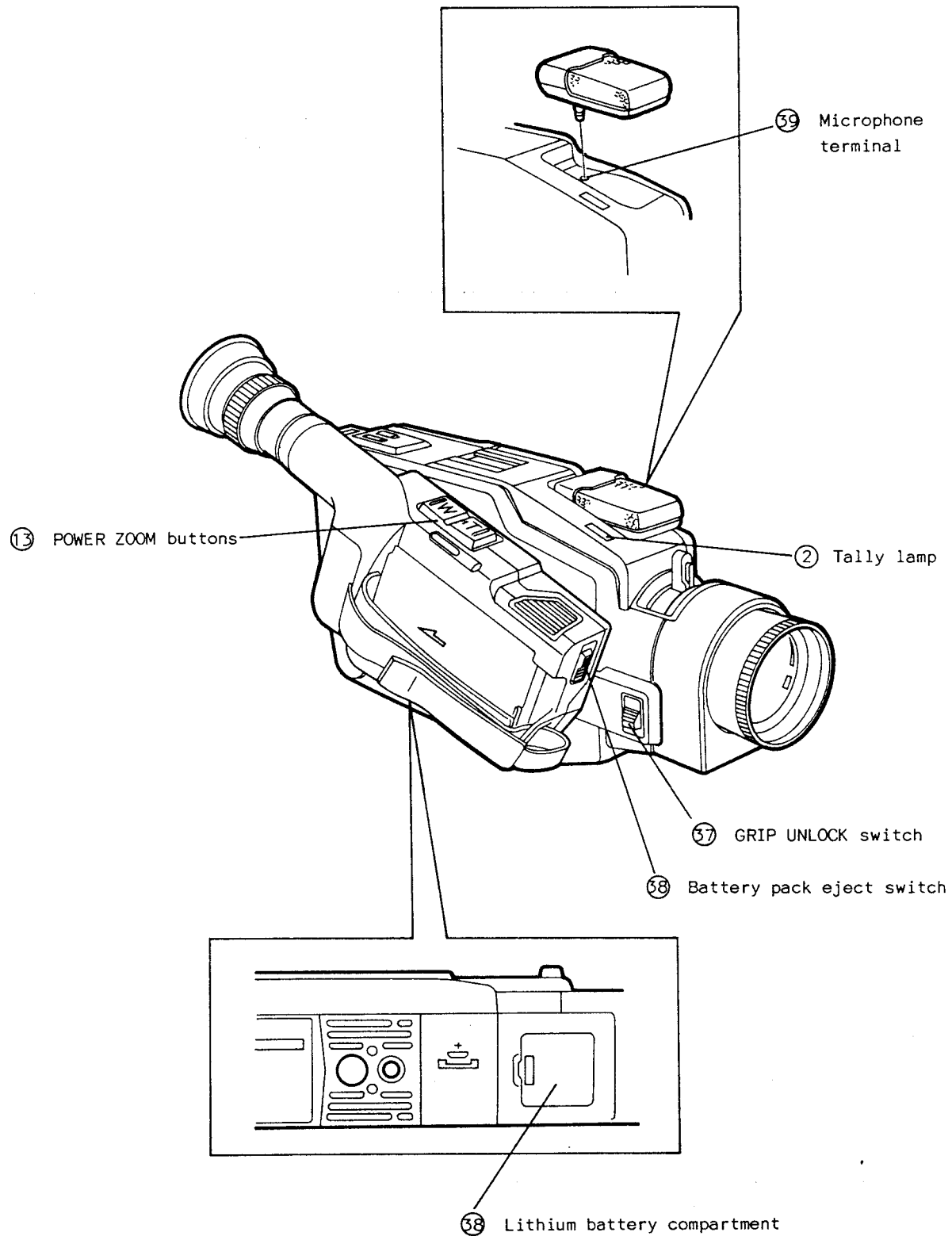


Fig. I-4

### 1-3 Brief description of control buttons, terminals and external parts

① Remote sensor

Infrared-light signals from the remote controller are received through this window.  
The signal-receivable range is approx. 30 degrees on each of the left and right angular sides and approx. 15 degrees on each of the upper and lower angular sides (with respect to the face of remote sensor). The maximum remote-control distance is five meters.

② Tally lamp

The tally lamp flashes during the camera recording operation or the self/interval timer operation. It lights up steadily when the remote control signal is received.

Camera recording operation ..... Flashes at a cycle of 1 Hz.  
Self-timer active state ..... Flashes at a cycle of 0.5 Hz.  
Interval-timer active state .... Flashes at a cycle of 0.5 Hz.  
Remote control operation ..... Lights up steadily.

③ DIGITAL TITLE DISPLAY button

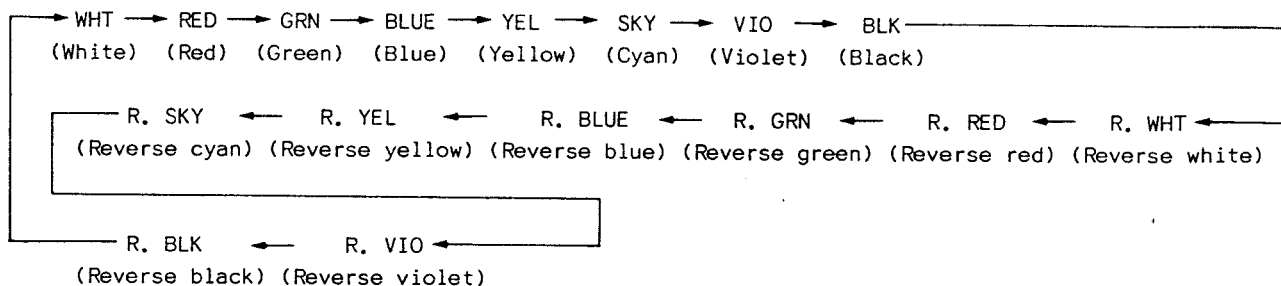
Pressing this button superimposes a memorized digital title on the screen being videographed in the CAMERA mode, i.e. a digital title can be superimposed during camera recording.

④ DIGITAL MEMORY button

Pressing this button lets the internal memory store a digital image. Also, an image having insufficient or excessive contrast can be adjusted gradually for better contrast by holding down this button. While it is held down, the original contrast of image is made higher through 8 steps and then it is changed from the lowest contrast state to the highest contrast state through 16 steps. Note that this contrast adjusting function is available only in monochrome (shades of gray).

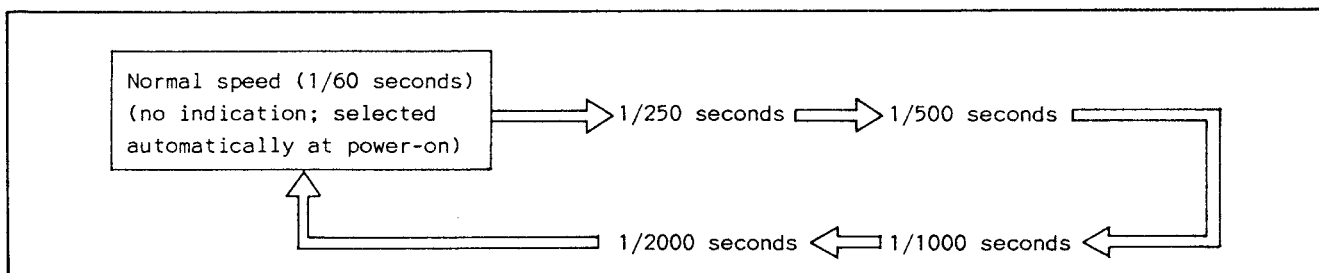
⑤ DIGITAL TITLE COLOUR button

The colour of a digital image stored with the DIGITAL MEMORY button 4 can be changed using this button. Each press of this button changes the colour of image (eight colours in each of non-reverse and reverse modes). Also, holding it down for more than three seconds sets up the see-through colour mode. In this mode, a videographed scene can be seen through the transparent digital image. The see-through mode can be canceled by holding it down again for more than three seconds.



⑥ HIGH-SPEED SHUTTER button

The shutter speed can be changed by pressing this button in the CAMERA mode. One of shutter speeds of 1/250, 1/500, 1/1000 and 1/2000 seconds is selectable in a cyclic manner as indicated below. The selected shutter speed is displayed on the viewfinder screen.



⑦ AWB/LOCK button

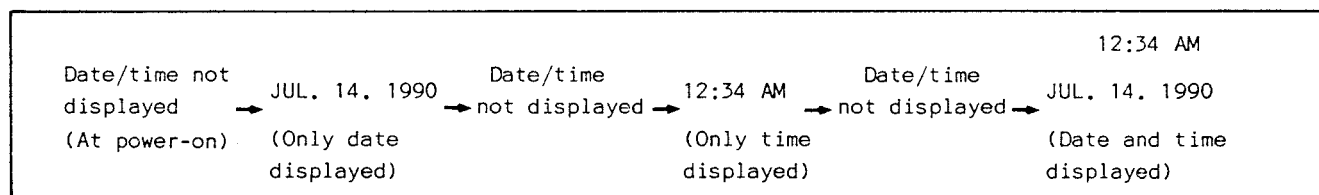
In the CAMERA mode, pressing this button toggles between the full-auto white balance state and the white balance lock state. When the white balance lock state is selected, 'WB LOCK' is indicated on the viewfinder screen.

⑧ CHARACTER TITLE DISPLAY button

Pressing this button superimposes a memorized character title on the scene being videographed. When it is pressed again, only the scene is recorded.

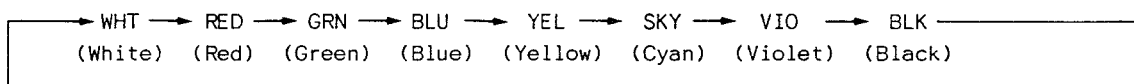
⑨ DATE DISPLAY button

Pressing this button displays the date and/or time on the viewfinder screen. In the CAMERA mode, the date/time can be superimposed on the scene.



⑩ CHARACTER TITLE COLOUR button

With any character title and date/time displayd on the viewfinder screen, each press of this button changes the colour in a cyclic manner as indicated below.



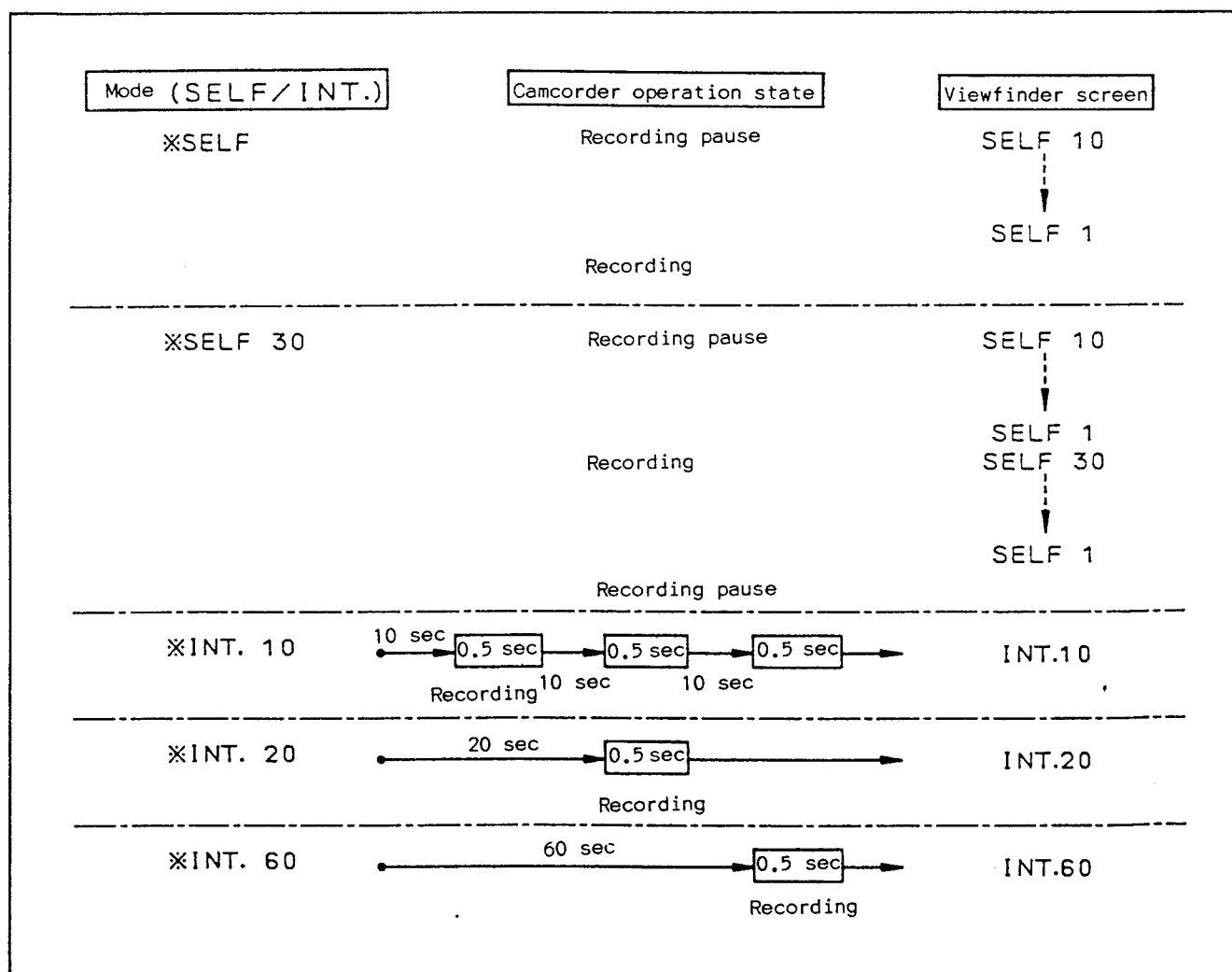
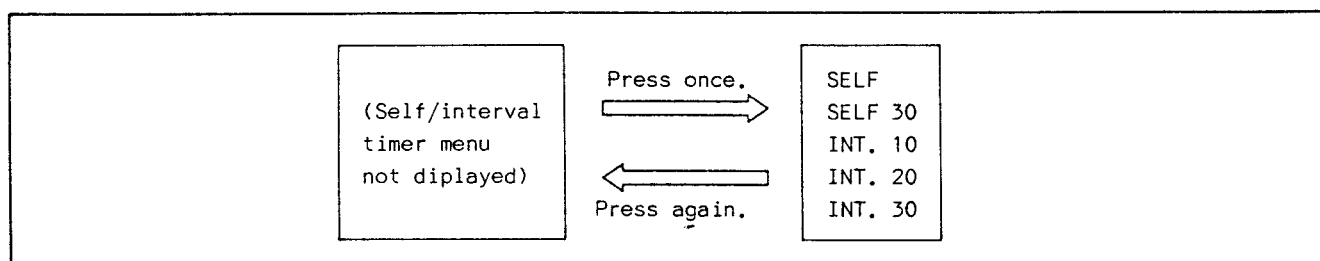
⑪ FADE button






In the CAMERA mode, holding down this button causes the picture and sound to disappear gradually (fade out). When it is released, they appear gradually (fade in). White fading is performed for approx. four seconds. Note that this white-fading function is not interlinked with the trigger button.

⑫ FOCUS button (AF/ATF/MANUAL)

In the CAMERA mode, the auto focusing, auto-tracking focusing or manual focusing is selectable by pressing this button. When the auto focusing or auto-tracking focusing is selected, the focus zone is displayed on the viewfinder screen.

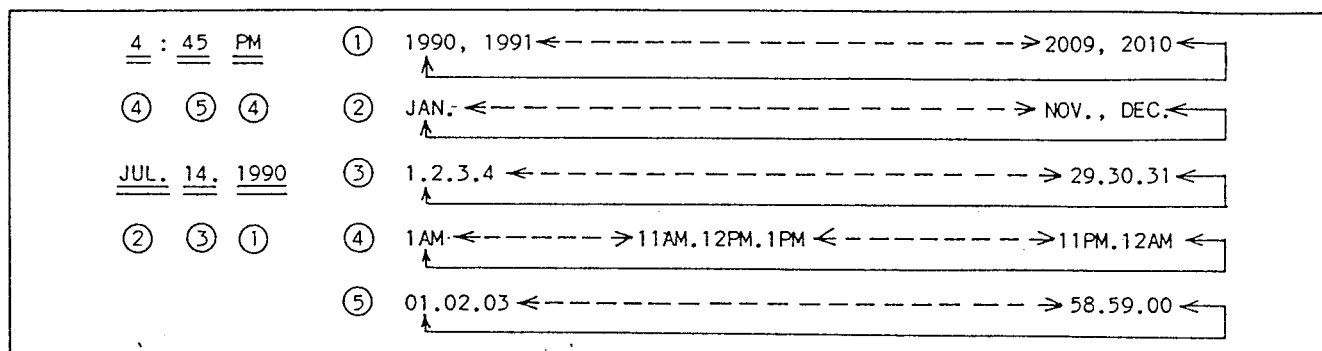
- ⑬ POWER ZOOM buttons  
With this button, the angle of view (frame) can be changed continuously in a range between the wide angle end and telephoto end.
- ⑭ Battery pack eject switch  
The battery pack can be taken out of the battery box by sliding this switch up.
- ⑮ TAPE SPEED button  
SP or LP recording mode is selectable at REC PAUSE, FF, REW or STOP mode.
- ⑯ SELF/INTERVAL TIMER button  
The self/interval timer menu is displayed on the viewfinder screen by pressing this button. When it is pressed again, the self/interval timer menu disappears from the viewfinder screen.



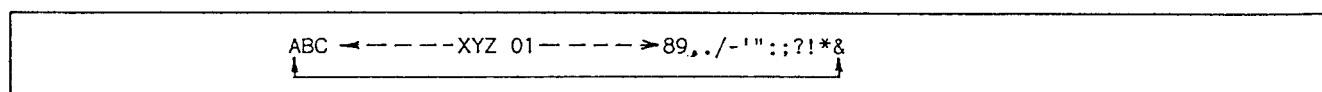
- ⑰ CASSETTE EJECT button  
In other than the recording mode, the videotape cassette can be ejected by pressing this button. Even in the power-off state, the cassette can be taken out.
- ⑱ OPERATE switch  
Used for turning power on/off.
- ⑲ OPERATE/ALARM lamp  
Under normal condition, this lamp lights up when the OPERATE switch is turned on. In the event of low battery voltage or moisture condensation, it flashes to give warning to the user.
- ⑳ REWIND button (  )  
Pressing this button in the stopped state rewinds the video tape. And, holding it down in the playback mode reproduces pictures in the reverse sequence rapidly at a speed of 9x fast motion. When this button is released, the normal playback operation is resumed. Also, by holding down this button during rewinding, pictures can be reproduced in the reverse sequence rapidly at a speed of 20x fast motion.
- ㉑ STOP button (  )  
Pressing this button causes tape drive to stop.
- ㉒ COUNTER RESET button  
In any mode, pressing this button resets the linear tape counter to zero (0:00:00). When the tape cassette is loaded, the counter is reset automatically. This counter is capable of counting up/down to  $\pm 9:59:59$ .
- ㉓ RECORD button  
When this button is pressed in the stopped state or the still playback state, the camcorder is set to the recording pause state.
- ㉔ PAUSE/STILL button (  )  
When this button is pressed during playback, the picture is made still. Then, when it is pressed in the still playback mode, the normal playback operation is resumed. When this button is pressed during recording, the recording pause mode is set up. Then, when it is pressed in the recording pause mode, the normal recording is resumed.
- ㉕ FAST FORWARD button (  )  
Pressing this button in the stopped state causes the video tape to be fed fast. And, holding it down in the playback mode reproduces pictures forward rapidly at a speed of 9x fast motion. When this button is released, the normal playback operation is resumed. Also, by holding down this button during fast-forwarding, pictures can be reproduced forward rapidly at a speed of 20x fast motion.
- ㉖ PLAY button (  )  
In other than the recording mode and recording pause mode, pressing this button starts the playback operation.

②⑦ PLUS/MINUS button (+/-)

- The date (year.month.day) and time (hours/minutes) can be set as desired using these buttons.



- The characters and digits of title can be selected as indicated below.

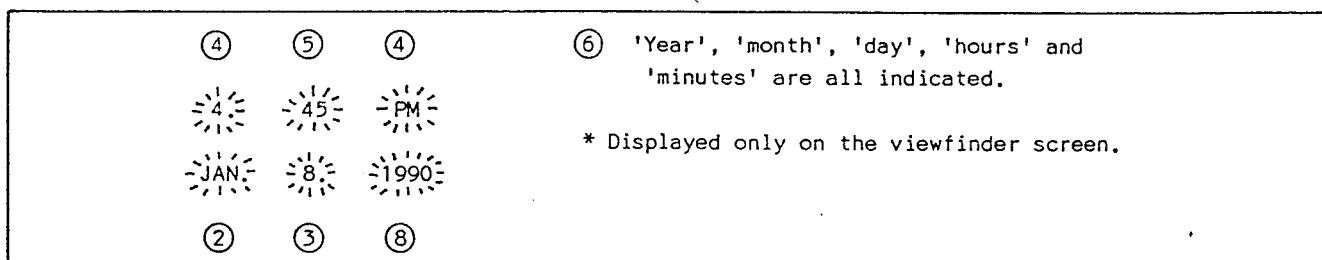


In the line input mode or during camera recording, it is not allowed to create a character title. (Camera recording is not allowed in the line input mode.)

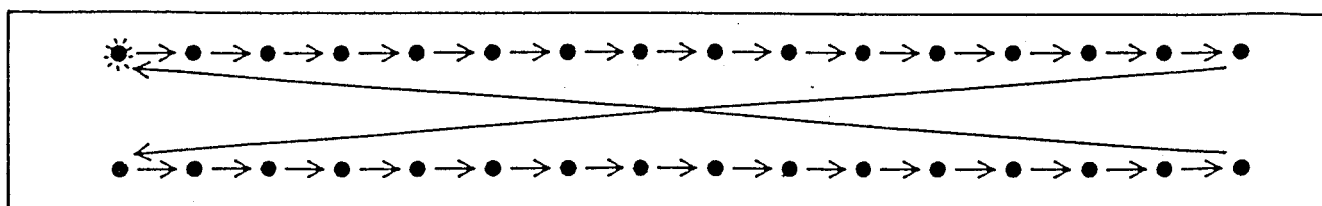
- In the recording pause mode, the recorded pictures can be searched by pressing the PLUS/MINUS button. (Pressing the PLUS button enables forward searching, and pressing the MINUS button enables backward searching.)
- When the (⊖) button is pushed in the recording pause state, the tape is played back for approx. 3 seconds so that the user can check the recording on the tape. Then, the recording pause state is set again at the previous position.

②⑧ SHIFT button

- In the auto date setting, 'year', 'month', 'day', 'hours' and 'minutes' can be selected by pressing this button.



- The title character position can be shifted using this button as indicated below. (16 characters x 2 lines)



- 29 CHARACTER TITLE/DATE SETTING button  
When this button is pressed once, the title setting mode is selected. In this mode, any desired title can be set with the PLUS/MINUS button. When the CHARACTER TITLE/DATE SETTING button is pressed again, the blinking of title is ceased and the title is stored into memory. When the CHARACTER TITLE/DATE SETTING button is held down for approx. three seconds, the date/time setting mode is selected. In this mode, the user can set 'year, month, day' or 'hours, minutes'.
- 30 EDIT button  
Used for editing pictures recorded on the videotape. Turn on this button only for editing in the PLAY mode. Deterioration of picture quality can be minimized by turning on this button. In common practice, keep it turned off.
- 31 Remote terminal  
Used for assemble editing or other simple editing of recorded pictures. Connect this terminal to another video source having the control terminal such as an editing machine, video camcorder or video deck.
- 32 S-video output terminal  
Used on S-video output for Y/C separation.
- 33 Audio/video terminal (A/V)  
Used for normal output of audio and video. For connection with a television unit not equipped with an audio/video input terminal, attach the RF unit.
- 34 RF unit DC output terminal  
Used for supplying +5 V power to the RF unit RU-E3.
- 35 Stereo audio output terminals (LR OUT)  
Used for outputting stereo sound.
- 36 START/STOP button  
When this button is pressed in the recording pause state, the recording operation is resumed. Pressing it again causes the camcorder to get back to the recording pause state. In the self/interval timer mode, the self/interval timer can be started/canceled with this button.
- 37 GRIP UNLOCK switch  
Turn the multi-action grip while holding down this button, and release it at a favorable grip position. Thus, the multi-action grip can be set to the desired shooting angle.
- 38 Lithium battery compartment  
Contains the lithium battery for auto date function. The lithium battery has a useful life of approx. one year.
- 39 Microphone terminal (ST. MIC)  
Used for connecting the accessory microphone or the monaural microphone available separately.
- 40 HEADPHONE TERMINAL  
Used for headphone output.
- 41 Microphone DC output terminal (DC OUT)  
Used for supplying DC power to the optional stereo microphone.



#### 1-4 Information display on electronic viewfinder

The electronic viewfinder in this camcorder lets the user readily know a repertoire of current statuses and settings. It displays the camera operating status, recorder operating status, warning message, etc. Still more, the user can select the auto date/title display mode or the timer setting menu mode at a touch of the button.

E800HiE

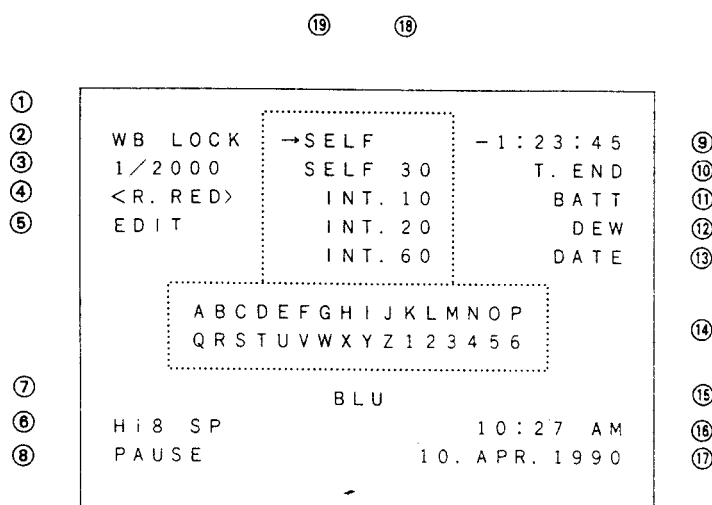
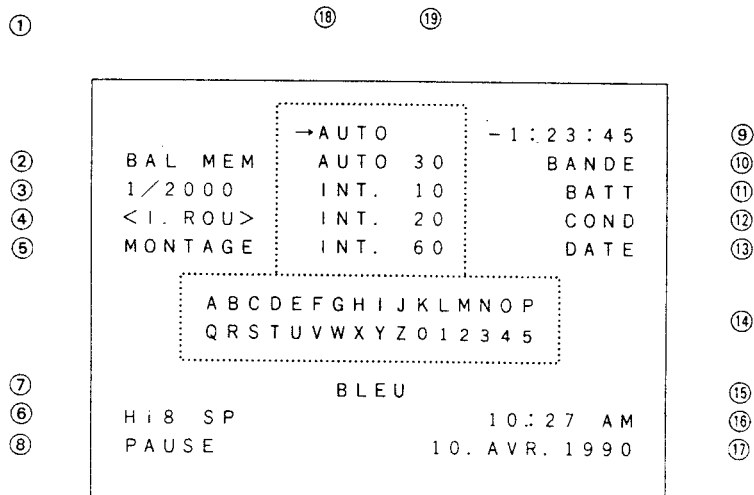


Fig. I-5

No.	Mode	Display	Description
①	Focus mode	(Focus zone)	When AF or Auto Tracking Focus mode is selected, the focus zone is displayed. In Auto Tracking Focus mode, the ATF zone changes in size according to focal depth of the subject.
		No display	The focus zone is not displayed in MANUAL mode.
②	White Balance	No display	Auto white balance
		WB LOCK	White balance lock
③	High Speed Shutter	No display	Normal shutter speed (1/50)
		1/250	1/250th of a second
		1/500	1/500th of a second
		1/1000	1/1000th of a second
		1/2000	1/2000th of a second
④	Digital Title Colour	WHT, RED, GRN, BLU, YEL, SKY, VIO, BLK	Digital title colours are displayed. For normal titles, abbreviated colour codes are displayed. Digital title colour selection; white, red, green, blue, yellow, sky blue, violet, black
		<WHT>	See-through colour (The same 8 colours can be selected.)
		R.WHT	Reverse colour (The same 8 colours can be selected.)
		<R.WHT>	Reverse see-through colour (The same 8 colours can be selected.)
⑤	EDIT Mode	EDIT	"EDIT" is not displayed in other modes. When the EDIT button is pressed, "EDIT" appears in viewfinder.
⑥	Hi8	No display	Standard 8mm mode
		Hi8	Hi8 mode

No.	Mode	Display	Description
⑦	Tape Speed	SP	Standard Play
		LP	Long Play
⑧	Operation	PAUSE	Record pause
		REC	Recording
		PLAY	Normal playback, fast forward playback (9X), or rewind playback (7X)
		STILL	Still playback
		STOP	Stop
		FF	Fast forward
		REW	Rewind
		EJECT	Eject function is operated.
		EJECT (flashes)	Safety mechanism functions
⑨	Tape Counter	– 9:59:59 to 9:59:59	Tape counter reading
⑩	Tape Status	TAPE (flashes)	No cassette loaded
		T.END	Tape reaches the end.
⑪	Battery Warning	BATT (flashes)	Battery charge is nearly exhausted.
⑫	Condensation	DEW (flashes)	Condensation is detected in camera (see p.64).
⑬	Lithium Battery Warning	DATE (flashes)	Lithium battery charge is low or no battery is inserted.
⑭	Character Title	2 lines × 16 characters	Alphabet: A to Z Special Characters and Accents: ÄÖÜØÅÆÑÇË Numerals: 0 to 9 Symbols: ,/_ ' '":;?!*&
⑮	Character Title Colour	WHT, RED, GRN, BLU, YEL, SKY, VIO, BLK	Character title and date/time colour codes are displayed. Character title and date/time colour selection: white, red, green, blue, yellow, sky blue, violet, black
⑯	Time	12:00 AM to 11:59 PM	Present time
⑰	Date	1. JAN. 1990 to 31. DEC. 2010	Current date
⑱	Timer Recording Menu	→SELF SELF 30 INT.10 INT.20 INT.60	→ Arrow indicates selected mode.
⑲	Timer Recording	0SEC—10SEC	Recording reminder
		SELF10—SELF1	Self timer countdown
		SELF30—SELF1	Self 30 recording
		INT.10	10 sec. interval recording
		INT.20	20 sec. interval recording
		INT.60	60 sec. interval recording



N°	Mode	Affichage	Description
①	Mode de mise au point	(zone de la mise au point)	Si vous sélectionnez les modes automatique AF ou ATF, la zone de la mise au point s'affiche. En mode ATF, la zone de mise au point apparaît dans la dimension possible, selon la profondeur de champ du sujet.
		Pas d'affichage	La zone de mise au point ne s'affiche pas en mode manuel.
②	Balance des blancs	Pas d'affichage	Balance automatique des blancs
		BAL MEM	Balance des blancs verrouillée
③	Vitesse d'obturation rapide	Pas d'affichage	Vitesse d'obturation normale (1/50)
		1/250	1/250ème de seconde
		1/500	1/500ème de seconde
		1/1000	1/1000ème de seconde
		1/2000	1/2000ème de seconde
④	Couleur de titrage digital	BLANC, ROUGE, VERT, BLEU, JAUNE, CIEL, VIO, NOIR	Les couleurs des titres digitaux sont affichées. Les codes de couleur sont affichés pour les titres normaux. Choix des couleurs de titre: blanc, rouge, vert, bleu, jaune, bleu ciel, violet, noir
		<BLA>	Transparent Possibilité de choisir parmi les 8 couleurs précédentes
		I.BLANC	Couleur inversée Possibilité de choisir parmi les 8 couleurs précédentes
		<I.BLA>	Transparent inversé Possibilité de choisir parmi les 8 couleurs précédentes
⑤	Mode MONTAGE	MONTAGE	L'indication MONTAGE n'est pas affichée dans les autres modes. L'indication MONTAGE apparaît dans le viseur dès que l'on appuie sur la touche MONTAGE
⑥	Hi8	Pas d'affichage	Mode normal 8 mm
		Hi8	Mode Hi8

N°	Mode	Affichage	Description
⑦	Vitesse de la bande	SP	Vitesse normale Doublement de la durée de la cassette
		LP	Ralenti
⑧	Fonctions	PAUSE	Pause tournage
		ENR.	Tournage
		LECT.	Lecture normale, lecture en avance rapide (9X) ou lecture en rembobinage (7X)
		ARRET	Arrêt sur image
		STOP	Arrêt
		AVAN.	Avance
		RET.	Rembobinage
		EJECT	Ejection de la cassette
⑨	Compteur de bande	EJECT (clignote)	Déclenchement du mécanisme de sécurité
		– 9:59:59 à 9:59:59	Chiffres du compteur
⑩	Bande	BANDE (clignote)	Il n'y a pas de cassette dans le camescope
		BANDE	Fin de bande
⑪	Batterie	BATT (clignote)	La batterie arrive à épuisement
⑫	Condensation	COND (clignote)	De la condensation a été détectée dans l'appareil (cf. page 68)
⑬	Batterie lithium	DATE (clignote)	La pile lithium arrive à épuisement ou absence de pile dans l'appareil.
⑭	Titre	2 lignes × 16 caractères	Lettres de l'alphabet: A à Z Chiffres: 0 à 9 Symboles: , / _ ' " : ; ? ! * & ç
⑮	Couleur de titrage	BLANC, ROUGE, VERT, BLEU, JAUNE, CIEL, VIO, NOIR	Les codes de couleur du titre de caractères s'affichent. Choix des couleurs de titre: blanc, rouge, vert, bleu, jaune, bleu ciel, violet, noir
⑯	Heure	12:00 AM à 11:59 PM	Les heures avant midi sont suivies de l'indication AM, les heures après-midi sont suivies de l'indication PM.
⑰	Date	JAN. 1. 1990 à DEC. 31. 2010	Date courante
⑱	Menu du retardateur	→ AUTO AUTO 30 INT.10 INT.20 INT.60	→ La flèche indique le menu sélectionné.
⑲	Retardateur	0SEC — 10SEC	Aide-mémoire de tournage
		10SEC — 1SEC	Compte à rebours du retardateur
		30SEC — 1SEC	Retardateur réglé sur 30 secondes
		INT.10	Intervalle de tournage réglé sur 10 sec.
		INT.20	Intervalle de tournage réglé sur 20 sec.
		INT.60	Intervalle de tournage réglé sur 60 sec.

1-5 E800Hi video system chart

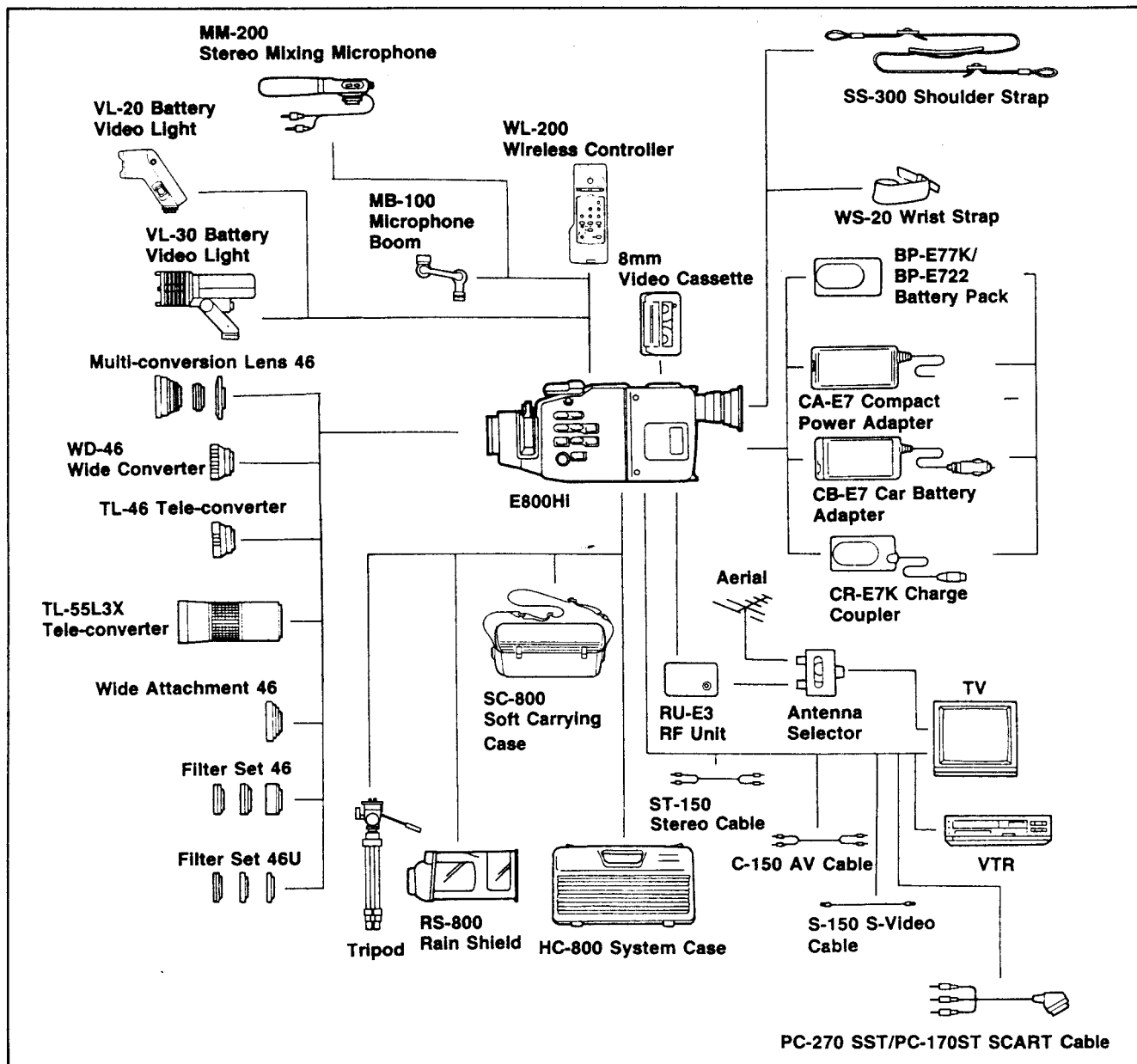


Fig. I-6

## 2. New Technologies

### 2-1 Fuzzy TV-AF

The AF system in this camcorder is designed to work on a basis of fuzzy logic reasoning, i.e. it is an auto-focus application of fuzzy automation theory.

The fuzzy theory method is a mathematical problem-solving approach with which 'ambiguities contained in linguistic or conceptual definitions' are handled through mathematical algorithms. Using this approach, it becomes rather easy to simulate multi-parameterized complex control, which otherwise requires substantial knowledge and experience of the expert.

#### 2-1-1 Fuzzy theory

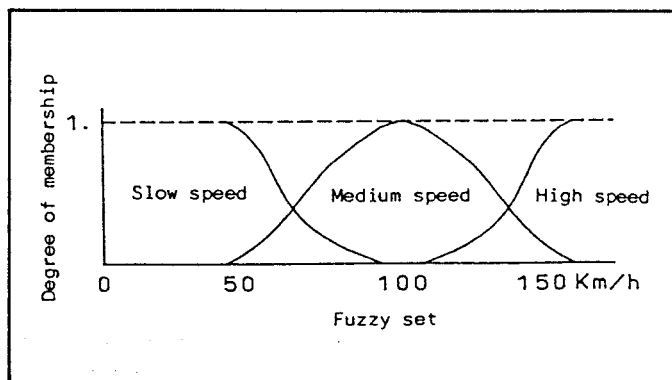
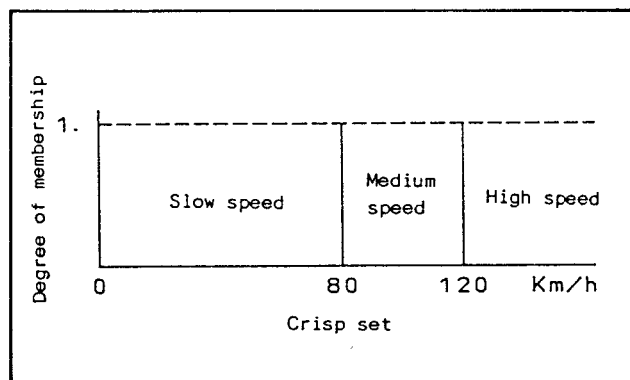
The fuzzy theory entails fuzzy sets and fuzzy logics. And, using the fuzzy sets and logics, the fuzzy inference algorithms are implemented in such industrial applications as sophisticated computer control and expert systems.

##### (1) Fuzzy set

The fuzzy set relationship represents a situation where there are no explicit boundaries in a set of events. For instance, assume that you are now driving an automobile on an expressway. In this situation, using the conventional approach, the feel of 'high speed' you may recognize can be digitized as shown in Fig. I-7 in which 'high speed' is predefined as a velocity of 'more than 120 km/hour'.

In contrast, 'high speed' in the fuzzy relationship is represented according to the degree of agreement with the concept of 'high speed' as shown in Fig. I-8. In the same fashion, 'medium speed' and 'low speed' can be represented conceptually as illustrated.

In this example, the membership characteristic functions 'high speed', 'medium speed' and 'slow speed' indicate each fuzzy set.



(2) Fuzzy logic Fig. I-7

Fig. I-8

The traditional logic handles propositions for which either truth or falsity may be determined in an alternative way. For instance, in the logical proposition that 'this camcorder is a machine', the subject is represented with its paired predicative concept containing no ambiguity.

In contrast, the fuzzy theory treats with such propositions having ambiguous predicates as 'she is beautiful' and 'this is a high speed'. That is, emphasis is placed on the significance of proposition rather than determination of truth or falsity in the fuzzy logic reasoning. The fuzzy theory is practically applied in the fuzzy inference scheme as demonstrated below.

(Known fact) This tomato is fairly red.

(Rule of inference) If the tomato is red, then it is ripe.

(Conclusion) This tomato is fairly ripe.

As can be seen from this example, in the fuzzy reasoning, there is no common term that serves as a medium for a particular fact and a specific rule. Any inferential rule is determined according to experiences and empirical conditions acquired before. Also, in the predicate of proposition, it is allowed to use such equivocal words as 'fairly' and 'quite'.

### (3) Fuzzy inference

The following explains how the fuzzy inference approach is employed in practical control application, taking the fuzzy auto-focus inference control as an example.

For instance, assume that the system has two input parameters A and B (numeric values) and one output C (numeric value). Under this condition, the fuzzy inferencing is carried out as shown below.

(Known facts)  $A = X, B = Y.$

(Rule of inference) If 'A' is big and also 'B' is small, then 'C' is middle.

(Conclusion)  $C = M$

- 1) The known facts correspond to the numerical representations indicating the current status of system.
- 2) The rule of inference is based on the experience, knowledge and reasoning of the human. In this example, each parameter has the membership characteristic function shown in Fig. I-8. The expression "A is big" is indicated by the degree of set membership 'Fx', and the expression "B is small" is indicated by the degree of set membership 'Fy'. These degrees of set memberships 'Fx' and 'Fy' are ANDed. Therefore, the degree of set membership 'Fy' is related with the membership characteristic function "C is middle". In this fashion, the height level, i.e. the degree of consequent proposition is restricted as shown in Fig. I-9.
- 3) The conclusion is expressed by the X-coordinate value (M) corresponding to the gravity center in profile of output membership function 'C'. The coordinate value 'M' is assigned as a numeric value of control output 'C'. In the practical inference scheme, more parameters and rules are given.

As exemplified above, the fuzzy inference approach makes it possible to quantify an ambiguous notion in the human brain. With this approach, complex control reasoning that has been allowed only by the human brain can be replicated technologically.

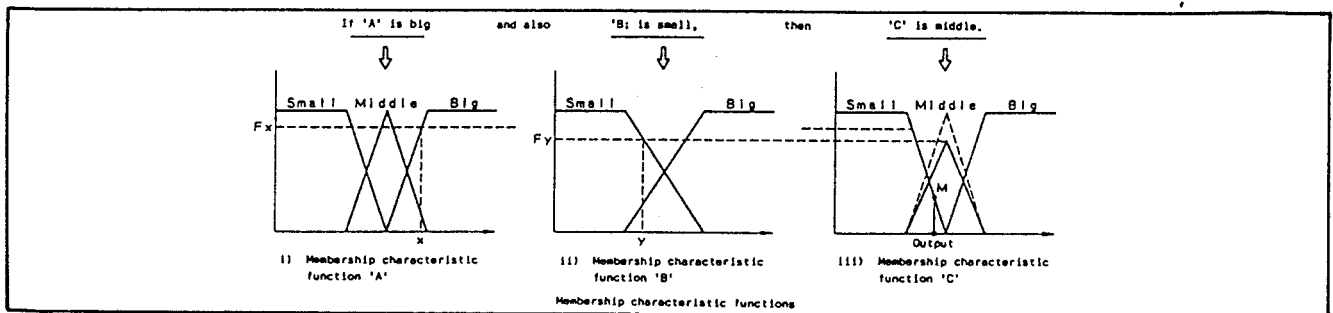


Fig. I-9

## 2-1-2 Fuzzy theory application to auto-focus control

The auto-focus control functionality in a camcorder can be divided into the following three major blocks:

- (1) Focus motor control block
- (2) In-focus judgment block
- (3) Restart judgment block

In this mode, the fuzzy theory is employed for the focus motor speed control block that provides the most vital function of camcorder operation.

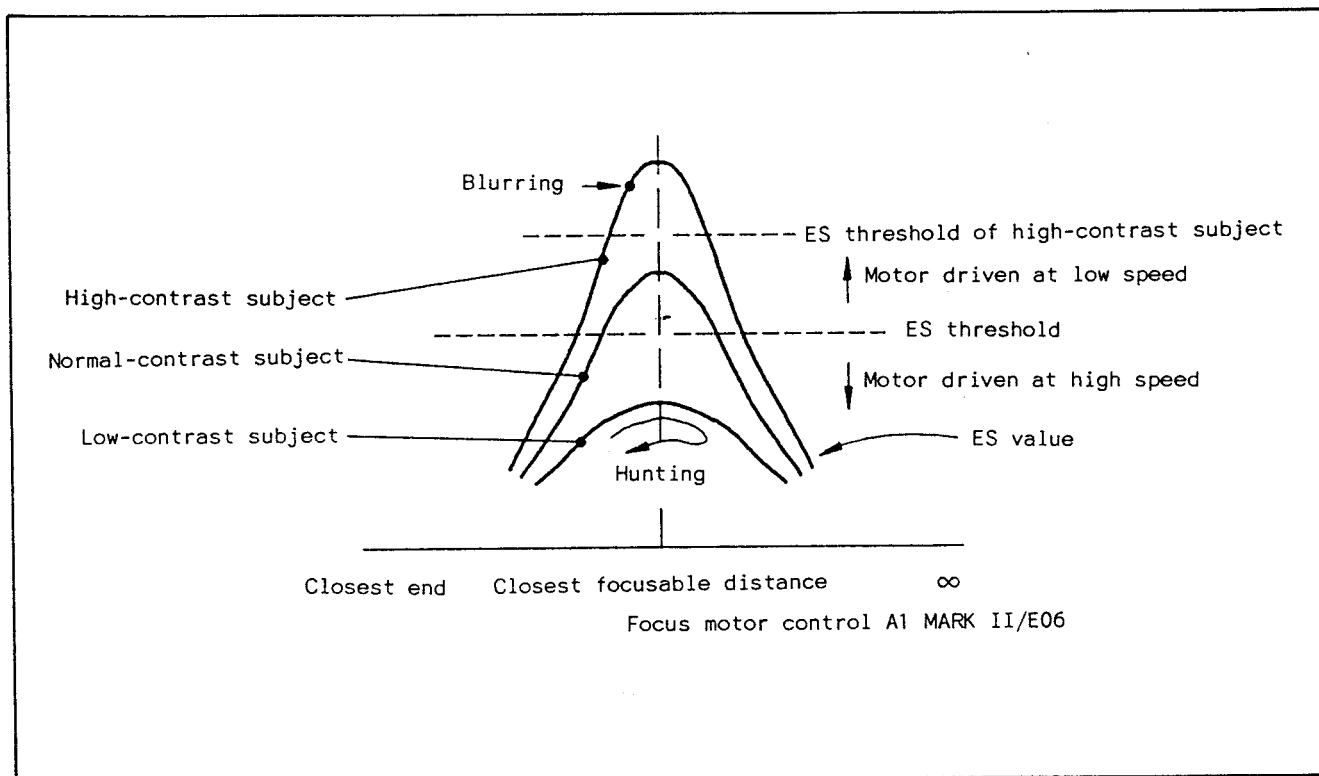


Fig. I-10

Numerated below are the advantages of fuzzy theory applied to motor control operation.

- (1) Multiple kinds of data can be processed without depending on an absolute ES value. This reduces dependency of the subject image condition and provides more immunity against variations in IC/motor operation. That is, hunting and blurring can be minimized without adding the special software and hardware.
- (2) The motor speed control output can be taken in binary (numeric) form. More specifically, 256 levels of motor speed control (-128 to +127 levels) are provided to enable smooth regulation of speed.
- (3) Multiple kinds of data can be evaluated in parallel, enhancing the ability of direction judgment. This reduces instability in malfunctioning and amplitude in hunting.
- (4) The overall benefit of fuzzy theory application lies in simplification of hardware design (reduction in circuit board size), allowing realization of the compact, cost-effective AF system.



### 2-1-3 Basic algorithm of fuzzy auto-focus control

Fig. I-11 shows the general flowchart of fuzzy auto-focus operation. Loop A indicates the operational loop to be taken when the image is out of focus, and loop B is taken when the image is in focus. The fuzzy inference control is used in loop A.

The fuzzy inference engine consists of six input membership functions (parameters: ES value, RV = ES value + high frequency component of video signal, ES difference value, FV difference value, etc.), one output membership function, and 13 inferential rules.

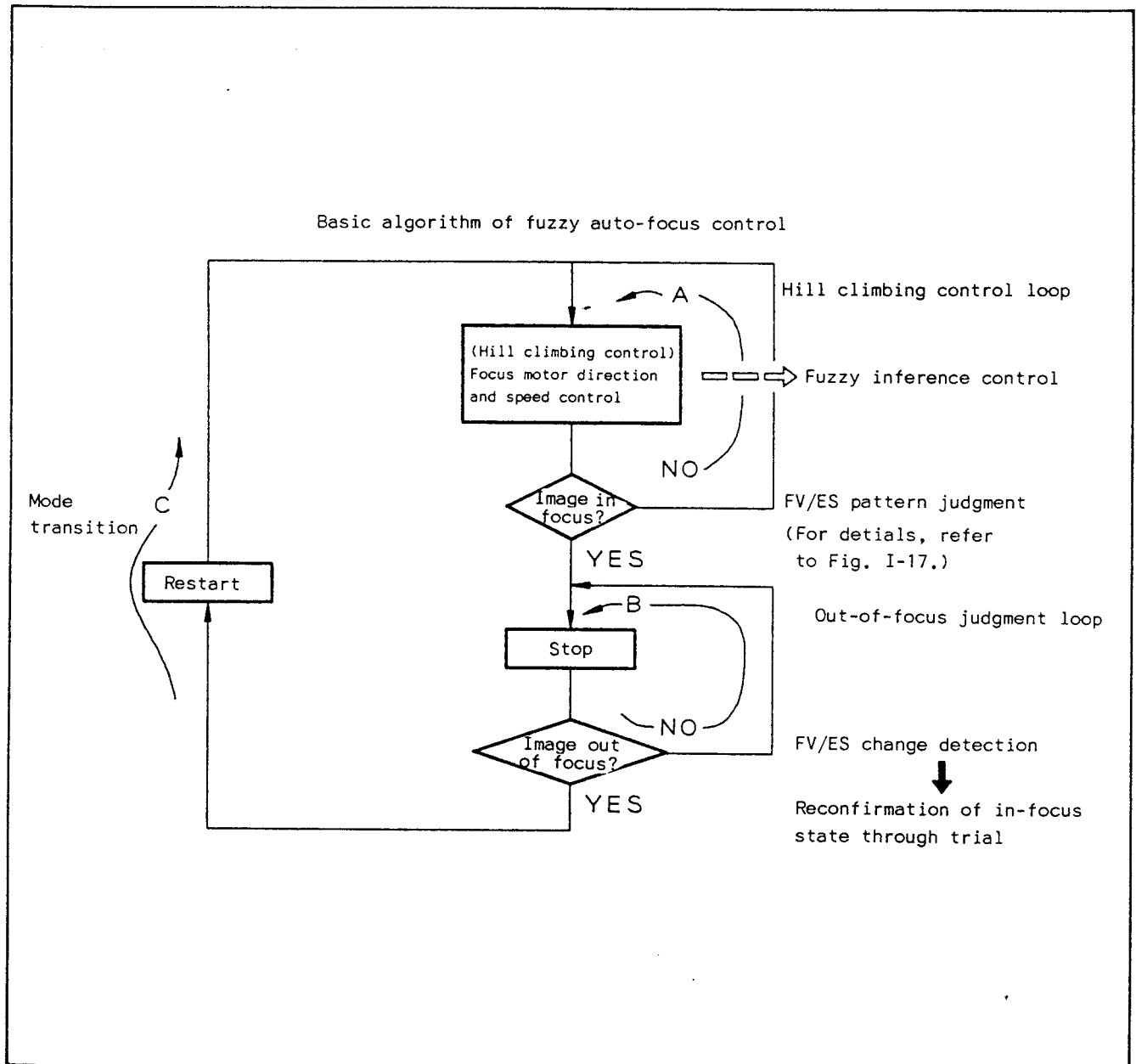


Fig. I-11

## 2-2 Auto-tracking focusing

### 2-2-1 Basic operating principle

The area of approx. 90% in the effective screen is divided into 16 by 16 (256) cells. In each cell, the peak position of ES signal determined per V scanning (frame) is tracked. In actual operation, the peak position is tracked within the rangefinding frame allowed for auto-tracking auto-focusing (to be described in detail on the next page). In tracking, if the peak position is located per V scanning, the image of scene may change too rapidly and an unintended subject in scene may be tracked. To prevent this, the computational processing is performed as described below.

In the computational processing for auto-tracking operation, the peak coordinate positions in the last three scanings are memorized and the center of these positions is determined. Further, the centers thus attained in several fields are averaged. The resultant value is taken as the peak coordinate position in the relevant field, and the distance measuring range is moved around this position for auto-tracking. In this fashion, the rangefinding frame is moved smoothly.

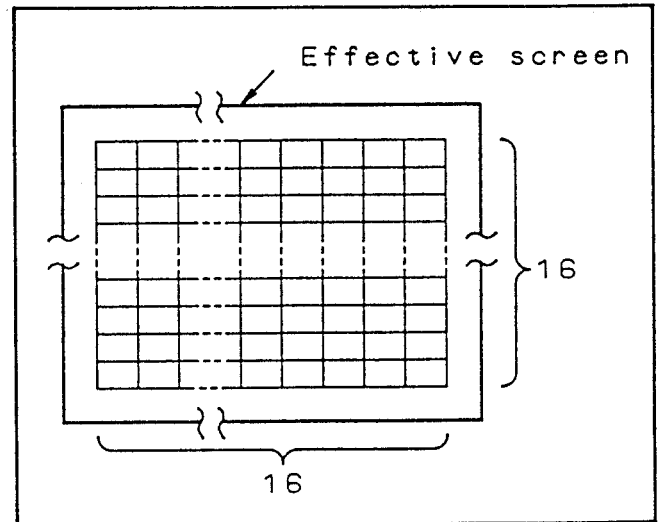


Fig. I-12

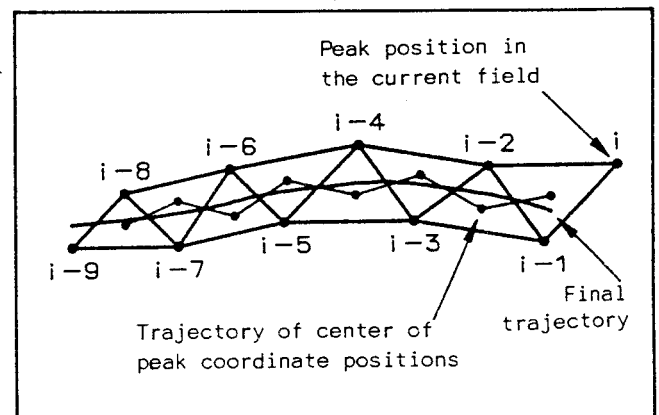


Fig. I-13

### 2-2-2 Rangefinding frame in auto-tracking auto-focusing

In the auto-tracking auto-focusing operation, the size and position of the rangefinding frame are automatically changed according to the depth of field of lens. The depth of field is determined by the focal length and 'f' stop value. In the model, the depth of field is divided into three levels for switchover of the rangefinding frame in auto-tracking auto-focusing as illustrated in Fig. I-14. Further, if the image becomes significantly out of focus at switchover to auto-tracking auto-focusing, the rangefinding frame is forced to shift to the center of screen.

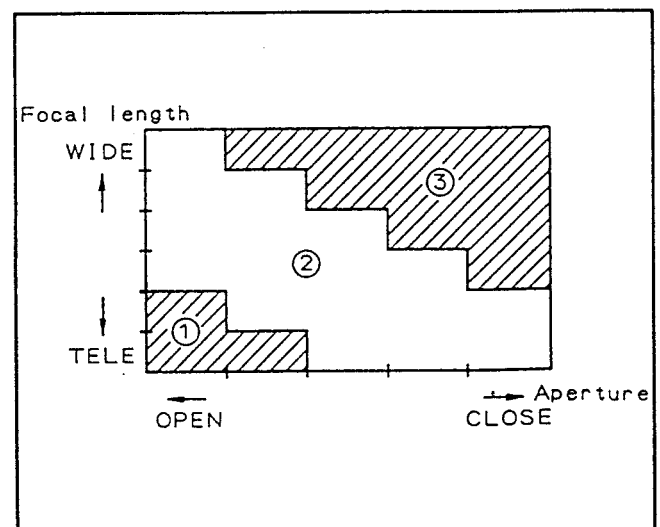
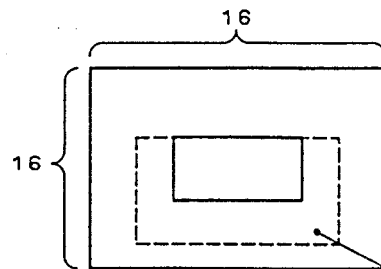
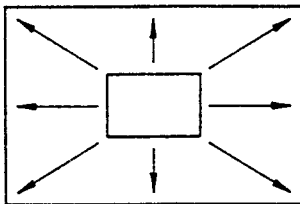


Fig. I-14

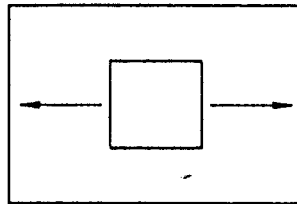


Schema a) shows the range-finding frame to be taken normal auto-focusing operation. This frame is  $5/16$  cells high by  $7/16$  cells wide, and not movable.

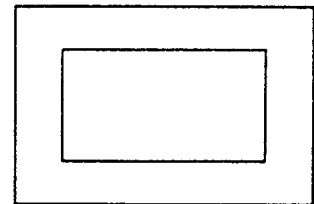
a) Normal auto-focusing:



b) When the depth of field is short: (Fig. I-14 ①)  
The rangefinding frame is  $5/16$  cells high by  $5/16$  cells wide. It can move in any direction on the screen.



c) When the depth of field is medium: (Fig. I-14 ②)  
This rangefinding frame is  $7/16$  cells high by  $5/16$  cells wide. It can move only in the horizontal direction.



d) When the depth of field is long: (Fig. I-14 ③)  
The nonmovable frame of  $9/16$  cells high by  $9/16$  cells wide is provided when the depth of field is long and the entire image on screen is in focus. In this case, the focus ring stops at a position of approx. 2.4 m.

Fig. I-15

### 3. Circuit Description

#### 3-1 Lens section

##### 3-1-1 Auto focus system

###### (1) Basic circuit configuration

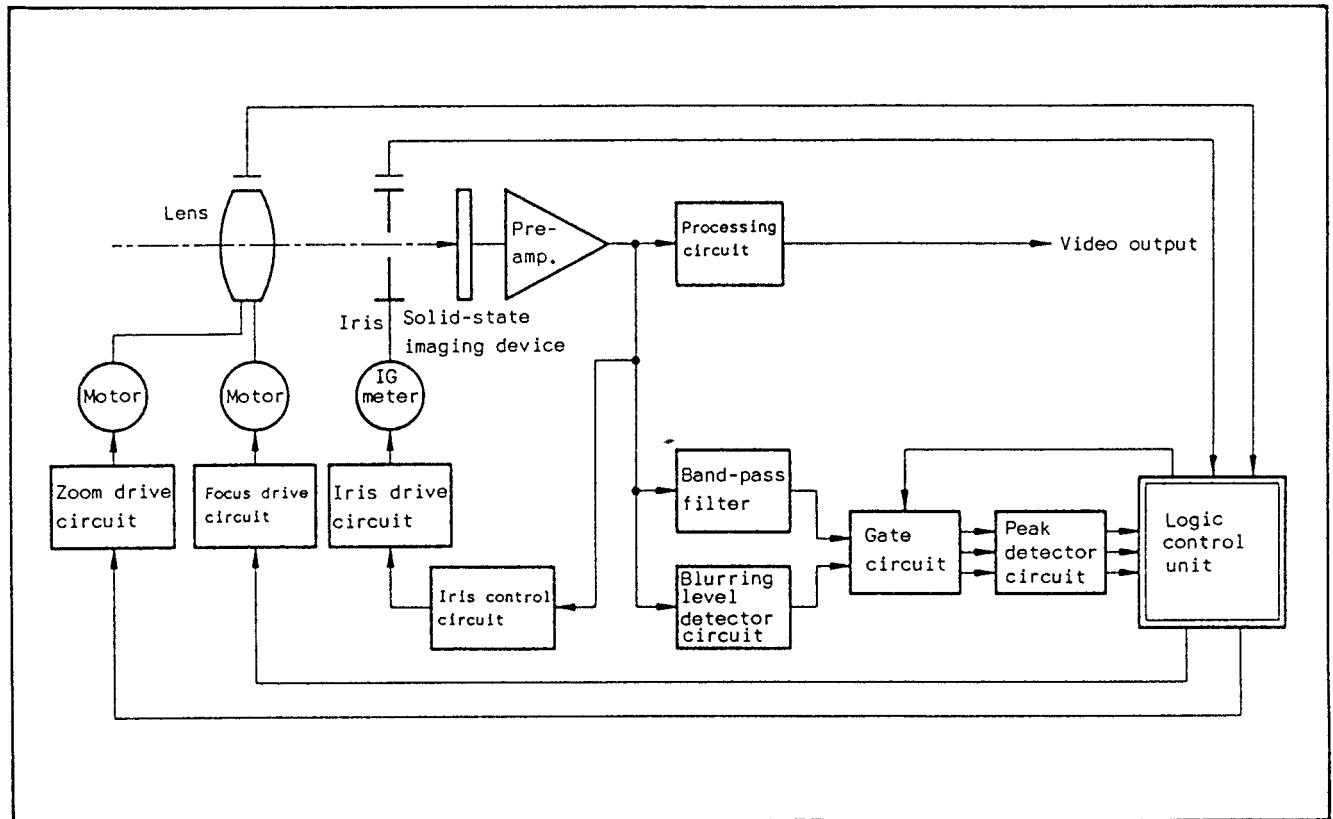


Fig. I-16

Fig. I-16 shows the auto focus circuit configuration in Model E800Hi.

Control function block	: 8 K-byte single-chip microcomputer
Signal processing function block	: TV-AF analog IC, digital IC, and motor drive circuit
Drive function block	: Focus motor (4.0 V drive circuit) Zoom motor (3.6 V drive circuit)
Position detecting function block:	Focusing ..... 2-bit photosensor Zooming ..... 3-bit photosensor Iris opening ... Hall-effect element

###### (2) Fuzzy inference engine

The fuzzy inference engine for focus motor control consists of six input membership functions, one output membership function, and 13 inferential rules. Refer to Figs. I-18 and 19. These membership functions and inferential rules have been attained using experimental data. Fig. I-17 shows the general flow of fuzzy inference sequence carried out with these functions and rules.

If the fuzzy inference program, the membership characteristics are represented using the mathematical functions (though there are some exceptions). For representation of each membership function, '100' is assigned as the maximum value on ordinate. That is, two-digit resolution is available for membership. This is predetermined through reconciliation of computational accuracy and memory consumption.

The center-of-gravity computation takes a multitude of steps if it is carried out exactly. To alleviate this computational condition, the profile of output membership is approximated to a rectangle in the fuzzy inference program. Further, the data is filtered to enable effective computational processing.

In the actual operational sequence, an output value of motor speed is adjusted so that it can be represented in one byte, i.e. it ranges from -128 to +127. Also, for the pulse-driven focus motor, the ON duration of pulse is made constant and the OFF duration is changed in proportion to the output value for regulating the motor drive speed.

Presented below are examples of the input and output membership functions and relevant inferential rule. The present fuzzy inference program employs six input membership functions, one output membership function, and 13 inferential rules. Fig. I-20 compares the AF motor control schemes of A1 MARK II and E800Hi.

Designation	Description
ES	ES value
FV	ES value + High frequency component value of video signal
dES	ES difference value
dFV	FV difference vlaue
PFMS	FMS value delayed by a certain number of fields
FMDIR	Approximate FMS value attained from previous data
FMS	Focus motor drive output

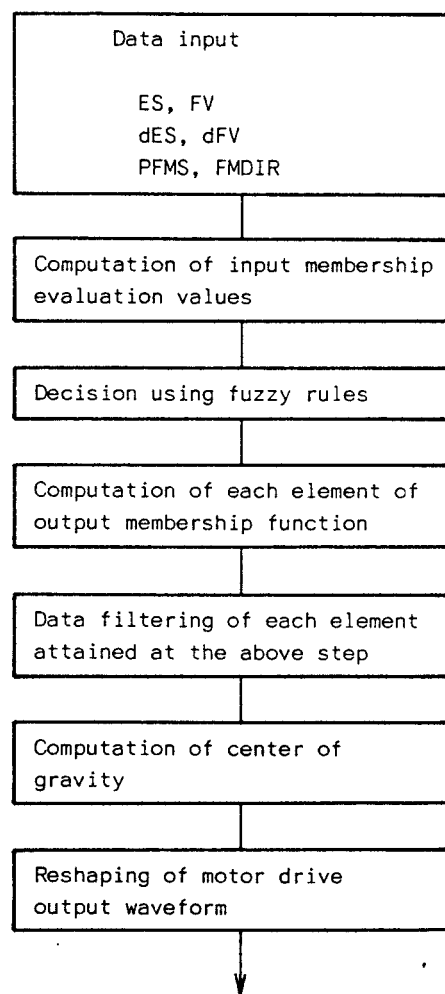


Fig. I-17

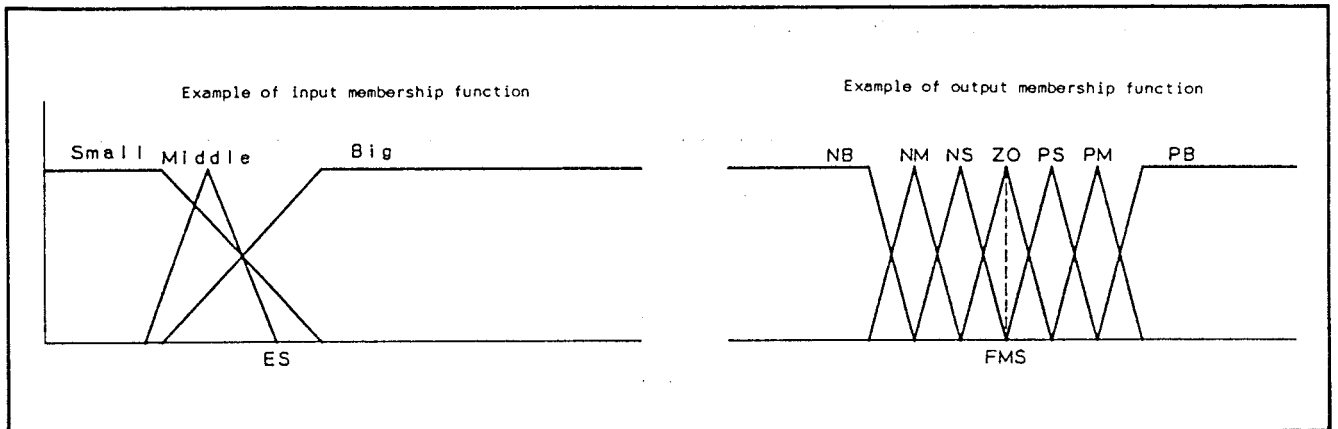


Fig. I-18

Example of inferential rule

ZO : If ES is 'Big' and also dES is 'Zero', then FMS is set to 'Zero'.

PS : If FMDIR is 'Pos', ES is 'Big' and also dES is 'PosBig', then FMS is set to "PosSmall".

PM : If PFMS is 'Neg', FV is 'Big and also dFV is 'NegBig', then FMS is set to 'PosMiddle'.

\* In the actual fuzzy inferencing, 13 rules are used.

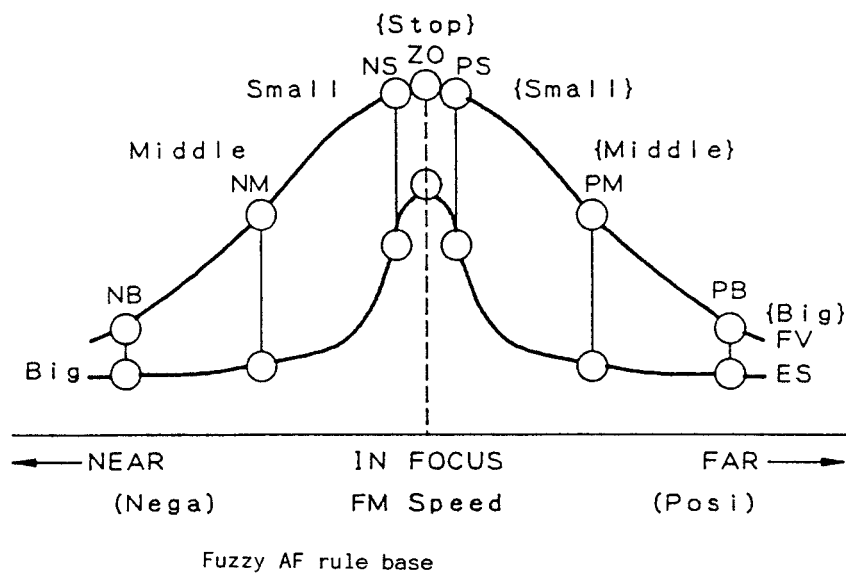


Fig. I-19

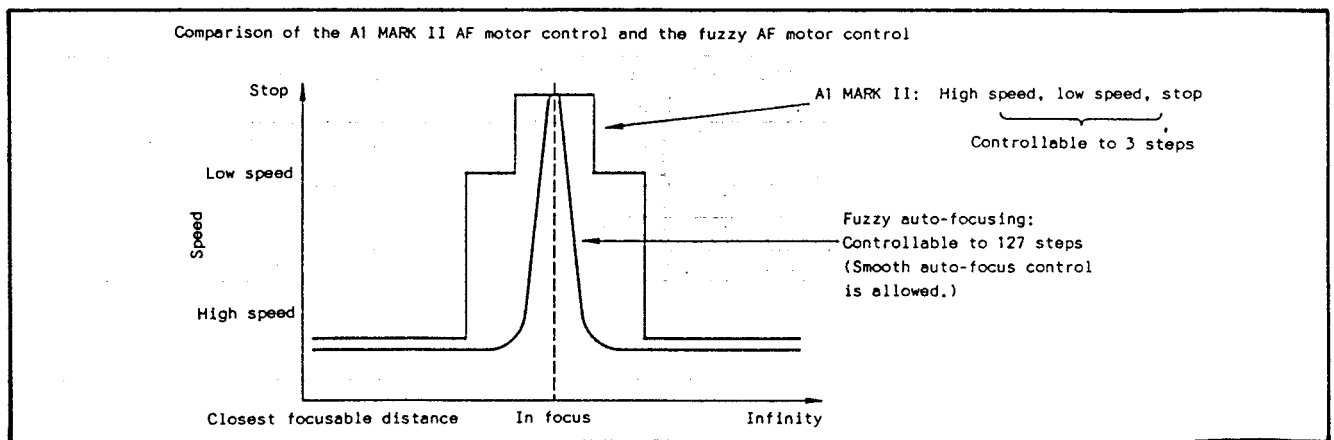


Fig. I-20

### 3-1-2 Pin functions of DIGITAL IC (IC2807)

Table I-2 (1/2)

Pin No.	Signal designation	I/O	Function																
1 2 8	AD7 2 AD0	I/O	Parallel communication bus connected with the AF microcomputer. The address and data signals are multiplexed in communication.																
9	ADDRESS READ	I	Input for internal latching of an address given to pins 1 to 8. The input address is read on the leading edge of 'High' plus, and held on the trailing edge of 'L' pulse.																
10	DATA WRITE	I	Input for internal latching of data given to pins 1 to 8. The input data is written on the leading edge of 'Low' pulse.																
11	DATA READ	I	Input for reading data from pins 1 to 8. The data is read on the leading edge of 'Low' pulse.																
12 15 18	NC	-	Open.																
19	CU PEAK	I	Input of the CU-value peak position signal. Under the AF area condition, when the pulse input is applied to terminal CU PEAK, the relevant address is stored into memory.																
20	ES PEAK	I	Input of the ES-value peak position signal. Under the AF area condition, when the pulse input is applied to terminal ES PEAK, the relevant address is stored into memory.																
21	HIGH BRIGHT DET	I	Input of the high-luminance detecting signal. This signal goes 'High' upon detection of high luminance.																
22	PAN	I	PAN signal input. According to the variation level of PAN signal on the entire screen, it is judged whether the camcorder is in the steady state or the panning state. When the camcorder is held steadily, the motor driving speed is regulated to minimize AF hunting.																
23	NC	-	Open.																
24	NC	-	Open.																
25	NC	-	Open.																
26	AF GATE PULSE	O	Gate pulse for AF rangefinding area.																
27	NC	-	Open.																
28	VDD	I	Connected with CAMERA 5V.																
29	V CLR	O	V clear signal. The 'High' pulse is output during the vertical blanking interval.																
30	SP	O	Sampling pulse. The 'Low' pulse is output during the vertical blanking interval.																
31 32	SEL 1 SEL 2	O	BPF gain select signal for the CU signal input. The 'High' pulse is output per 3V. <table border="1"> <tr> <td></td><th colspan="3">BPF</th></tr> <tr> <th>Signal</th><th>7.5 times</th><th>15 time</th><th>29.5 times</th></tr> <tr> <td>SEL 1</td><td>0</td><td>0</td><td>1</td></tr> <tr> <td>SEL 2</td><td>0</td><td>1</td><td>0</td></tr> </table>		BPF			Signal	7.5 times	15 time	29.5 times	SEL 1	0	0	1	SEL 2	0	1	0
	BPF																		
Signal	7.5 times	15 time	29.5 times																
SEL 1	0	0	1																
SEL 2	0	1	0																
33 34 35	NC	-	Open.																

\* The SEL 1 and 2 signals are different in phasing.

Table I-2 (2/2)

Pin No.	Signal designation	I/O	Function
36	NTSC (H) / PAL (L)	I	Input for selection between the NTSC system and the PAL system. This signal becomes 'High' when the NTSC system is selected, and it becomes 'Low' when the PAL system is selected.
37	HD	I	Horizontal sync signal input.
38	NC	-	Open.
39	CLOCK	I	Clock signal input.
40	GND	-	Connected with ground.
41	VD	I	Vertical sync signal input.
42	GND	-	Connected with ground.
43	AF FRAME	O	Display signal for AF area.
44	INTERRUPT	O	Interrupt signal output in parallel communication with the AF microcomputer.

## 3-1-3 AF microcomputer (IC2803)

Table I-3 (1/3)

Pin No.	Signal designation	I/O	Function												
1	NC	-	Open.												
2	NC	-	Open.												
3	NC	-	Open.												
4 2 11	AD7 2 ADO	I/O	Parallel communication bus connected with the DIGITAL IC. The address and data signals are multiplexed in communication.												
12	DATA WRITE	O	Output for writing data from pins 4 to 11 into the DIGITAL IC. The data is written on the leading edge of 'Low' pulse.												
13	DATA READ	O	Output for reading data from pin 1 to 8 of the DIGITAL IC. The data is read on the leading edge of 'Low' pulse.												
14	ADDRESS READ	O	Output for reading an address from pins 4 to 11 into the DIGITAL IC. The address is read on the leading edge of 'High' pulse, and held on the trailing edge.												
15	AF FRAME ON (H)	O	Display control for AF area. The AF area is displayed when this signal goes 'High'.												
16 17	SPEED ADJ. SW 1 SPEED ADJ. SW 2	I	Adjustment terminal for AF motor speed. Motor speed (REF) is adjustable in 3 steps using 2 bits. <table border="1"> <tr> <th>SIGNAL</th><th>Speed-up</th><th>Normal</th><th>Speed-down</th></tr> <tr> <td>S.A. SW 1</td><td>L</td><td>L</td><td>H</td></tr> <tr> <td>S.A. SW 2</td><td>H</td><td>L</td><td>L</td></tr> </table>	SIGNAL	Speed-up	Normal	Speed-down	S.A. SW 1	L	L	H	S.A. SW 2	H	L	L
SIGNAL	Speed-up	Normal	Speed-down												
S.A. SW 1	L	L	H												
S.A. SW 2	H	L	L												
18	STB	I	Interrupt signal input in serial communication. (For adjustment at the plant)												
19	INTERRUPT	I	Interrupt signal input in parallel communication with the DIGITAL IC (IC2807).												
20 2 24	NC	-	Open.												
25	GND	-	Connected with ground.												
26	RESET (L)	I	Reset input. Resetting is performed when this signal goes 'Low'.												



Table I-3 (2/3)

Pin No.	Signal designation	I/O	Function																																
27	NC	-	Open.																																
28	X IN	I	Connected with 10 MHz crystal oscillator.																																
29	X OUT	O																																	
30	NC	-	Open.																																
31																																			
32	GND	-	Connected with ground.																																
33	NC	-	Open.																																
34																																			
35	SPEED ADJ. MODE (H)	I	Unused.																																
36	NC	-	Open.																																
37	AF MODE 1	I	Input for AF mode selection. <table border="1"><tr><th>Mode \ Signal</th><th>AF</th><th>ATF</th><th>MANUAL</th></tr><tr><td>AF MODE 1</td><td>H</td><td>L</td><td>-</td></tr><tr><td>AF MODE 2</td><td>H</td><td>L</td><td>L</td></tr></table>	Mode \ Signal	AF	ATF	MANUAL	AF MODE 1	H	L	-	AF MODE 2	H	L	L																				
Mode \ Signal	AF			ATF	MANUAL																														
AF MODE 1	H			L	-																														
AF MODE 2	H	L	L																																
38	AF MODE 2																																		
39	WIDE SW (H)	I	WIDE switch input. This signal becomes 'High' when the WIDE switch is pressed.																																
40	TELE SW (H)	I	TELE switch input. This signal becomes 'High' when the TELE switch is pressed.																																
41	NC	-	Open.																																
42	TELE (H)	O	Telephoto drive signal for the PZ motor.																																
43	WIDE (H)	O	Wide-angle drive signal for the PZ motor.																																
44	NC	-	Open.																																
45	NC	-	Open.																																
46	NC	-	Open.																																
47	GND	-	Connected with ground.																																
48	AF NEAR	-	Near focusing drive signal for the AF motor. PWM output signal.																																
49	AF FAR	O	Far focusing drive signal for the AF motor. PWM output signal.																																
50	NC	-	Open.																																
51	NC	-	Open.																																
52	LED CONT.	O	LED control signal of the photo reflector for focus/zoom position detection. The LED indicator turns on when this signal goes 'High', and it turns off when this signal goes 'Low'.																																
53	FOCUS 0	I	Photo reflector signal input for focus position detection. <table border="1"><tr><th>Zone \ Signal</th><th>0.6 m</th><th>0.6 m ~ 1.2 m</th><th>1.2 m ~ ∞</th><th>∞</th></tr><tr><td>FOCUS 0</td><td>H</td><td>H</td><td>L</td><td>L</td></tr><tr><td>FOCUS 1</td><td>L</td><td>H</td><td>H</td><td>L</td></tr></table>	Zone \ Signal	0.6 m	0.6 m ~ 1.2 m	1.2 m ~ ∞	∞	FOCUS 0	H	H	L	L	FOCUS 1	L	H	H	L																	
Zone \ Signal	0.6 m			0.6 m ~ 1.2 m	1.2 m ~ ∞	∞																													
FOCUS 0	H			H	L	L																													
FOCUS 1	L	H	H	L																															
54	FOCUS 1																																		
55	ZOOM 0	I	Photo reflector signal input for zoom position detection. <table border="1"><tr><th>Zone \ Signal</th><th>8 mm ~ 14 mm</th><th>14 mm ~ 20 mm</th><th>20 mm ~ 28 mm</th><th>28 mm ~ 40 mm</th><th>40 mm ~ 56 mm</th><th>56 mm ~ 65 mm</th><th>65 mm ~ 68 mm</th></tr><tr><td>ZOOM 0</td><td>H</td><td>H</td><td>L</td><td>L</td><td>H</td><td>H</td><td>L</td></tr><tr><td>ZOOM 1</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>L</td></tr><tr><td>ZOOM 2</td><td>H</td><td>L</td><td>L</td><td>L</td><td>L</td><td>H</td><td>H</td></tr></table>	Zone \ Signal	8 mm ~ 14 mm	14 mm ~ 20 mm	20 mm ~ 28 mm	28 mm ~ 40 mm	40 mm ~ 56 mm	56 mm ~ 65 mm	65 mm ~ 68 mm	ZOOM 0	H	H	L	L	H	H	L	ZOOM 1	H	H	H	L	L	L	L	ZOOM 2	H	L	L	L	L	H	H
Zone \ Signal	8 mm ~ 14 mm			14 mm ~ 20 mm	20 mm ~ 28 mm	28 mm ~ 40 mm	40 mm ~ 56 mm	56 mm ~ 65 mm	65 mm ~ 68 mm																										
ZOOM 0	H			H	L	L	H	H	L																										
ZOOM 1	H			H	H	L	L	L	L																										
ZOOM 2	H	L	L	L	L	H	H																												
56	ZOOM 1																																		
57	ZOOM 2																																		

Table I-3 (3/3)

Pin No.	Signal designation	I/O	Function
58	GND	-	Connected with ground.
59	GND	-	Connected with ground.
60	IRIS POSITION	I	Signal input for iris position detection Open: 2.8 V    Close: 0.8 V
61	ES	I	ES value input.
62	CU	I	CU value input.
63	GND	-	Connected with ground.
64	GND	-	Connected with ground.
65	GND	-	Connected with ground.
66	SPEED REF.	O	Reference voltage of PZ motor speed. Invariable.
67	NC	-	Open.
68	DA VREF	I	3.6 V reference voltage input.
69	AD VREF	I	
70	GND	-	Connected with ground.
71	VCC	I	Connected with CAMERA 5V.
72	VCC	I	Connected with CAMERA 5V.
73	GND	-	Connected with ground.
74	AF CS	O	Communication serial line for character generation (for adjustment at the plant).
75	AF CLOCK	O	
76	DATA OUT	O	
77	DATA IN	I	
78	NC	-	Open.
79	NTSC (H) / PAL (L)	I	NTSC-PAL selection input. This signal becomes 'High' when the NTSC system is selected, and it becomes 'Low' when the PAL system is selected.
80	NC	-	Open.

### 3-1-4 Pin functions of CAMERA-KEY microcomputer (IC2101)

Table I-4 (1/2)

Pin No.	Signal designation	I/O	Function												
1	RESET (L)	I	Microcomputer reset input.												
2	GND	-	Connected with ground.												
3	Vss	-	Connected with ground.												
4	VREF	I	Connected with SS 5V.												
5	KEY IN 0	I	Key matrix input.												
6	KEY IN 1														
7	PAL (H)/SECAM (L)	I	For selection between the PAL and SECAM market. This signal is set to 'High' level for PAL, and it is set to 'Low' level for SECAM.												
8	-	-	Unused.												
9	Vcc	I	Connected with SS 5V.												
10	SAMPLE LEV. (1)	O	Take-in level reference output for digital title (threshold level output). The threshold value can be changed through 16 levels using combinations of four bits. Thus, it is allowed to change the take-in level in a range of 10% to 60%.												
11	SAMPLE LEV. (2)														
12	SAMPLE LEV. (3)														
13	SAMPLE LEV. (4)														
14	AF MODE 1	O	AF mode control output <table border="1"><tr><th>MODE</th><th>AF MODE 1</th><th>AF MODE 2</th></tr><tr><td>AF</td><td>H</td><td>H</td></tr><tr><td>ATF</td><td>L</td><td>H</td></tr><tr><td>MANUAL</td><td>-</td><td>L</td></tr></table>	MODE	AF MODE 1	AF MODE 2	AF	H	H	ATF	L	H	MANUAL	-	L
MODE	AF MODE 1			AF MODE 2											
AF	H			H											
ATF	L			H											
MANUAL	-	L													
15	AF MODE 2														
16	RAM-CS (H)	O	Communication enable signal for the digital title memory SRAM. When the digital title mode is selected, this signal goes 'High' to enable communication between SRAM (IC2701) and controller (IC2702) on the DIGITAL MEMORY C.B.A.												
17	NTSC (H)/PAL (L)	I	NTSC-PAL selection input. This signal becomes 'High' when the NTSC system is selected, and it becomes 'Low' when the PAL system is selected.												
18	TELE (L)	O	Telephoto drive signal for the PZ motor.												
19	WIDE (L)	O	Wide-angle drive signal for the PZ motor.												
20	Vss	-	Connected with ground.												
21	Vss	-	Connected with ground.												
22	FADE (H)	O	Fade control signal output. The fade control signal is output when this signal goes 'High'.												
23	SAMPLE FADE (H)	O	When the digital title take-in level is variable, the back-ground scene (not imposed) is forcedly faded to the white level for making the take-in level judgment easy. This signal goes 'High' when the sample fading is performed.												
24	SEE THROUGH (H)	O	This signal goes 'High' when the see-through mode is selected.												
25	CAMERA ON (L)	O	Camera power control signal. The camera power control signal turns on when this signal goes 'Low'.												
26	RGB-CS (H)	O	Chip select signal for serial data communication with the RGB controller (IC2708). Serial data communication is allowed while this signal is 'High'.												

Table I-4 (2/2)

Pin No.	Signal designation	I/O	Function																								
27	TITLE-CS (H)	0	Chip select signal for serial data communication with the controller (IC2702). Serial data communication is allowed while this signal is 'High'.																								
28	CG-STROBE (H)	0	Instruction signal for reading data into the character IC (IC2941).																								
29	CG-CS (H)	0	Chip select signal for serial data communication with the character generator (IC2941). Serial data communication is allowed while this signal is 'High'.																								
30	CK-REQUEST (L)	0	Communication request signal output to the main microcomputer (IC503). Communication with the main microcomputer is enabled while this signal is 'Low'.																								
31	CK-CS (H)	I	Chip select signal for serial data communication with the main microcomputer (IC503). Serial data communication is allowed while this signal is 'High'.																								
32	S-CLOCK	I/O	Clock input/output for serial data communication with the main microcomputer (IC503), character generator (IC2941), edit microcomputer and controller (IC2702).																								
33	S-DATA OUT	0	Data output for serial communication with the main microcomputer (IC503), character generator (IC2941), edit microcomputer and controller (IC2702).																								
34	S-DATA IN	I	Data input for serial communication with the main microcomputer (IC503), character generator (IC2941), edit microcomputer and controller (IC2702).																								
35	SHUTTER SPEED 1	0	<table><tr><td></td><td>1/60</td><td>1/250</td><td>1/500</td><td>1/1000</td><td>1/2000</td></tr><tr><td>SHUTTER SPEED 1</td><td>L</td><td>H</td><td>L</td><td>H</td><td>L</td></tr><tr><td>SHUTTER SPEED 2</td><td>L</td><td>L</td><td>H</td><td>H</td><td>L</td></tr><tr><td>SHUTTER SPEED 3</td><td>L</td><td>L</td><td>L</td><td>L</td><td>H</td></tr></table>		1/60	1/250	1/500	1/1000	1/2000	SHUTTER SPEED 1	L	H	L	H	L	SHUTTER SPEED 2	L	L	H	H	L	SHUTTER SPEED 3	L	L	L	L	H
	1/60			1/250	1/500	1/1000	1/2000																				
SHUTTER SPEED 1	L			H	L	H	L																				
SHUTTER SPEED 2	L	L		H	H	L																					
SHUTTER SPEED 3	L	L	L	L	H																						
36	SHUTTER SPEED 2																										
37	SHUTTER SPEED 3																										
38	F AWB (H)	-	AWB circuit control/communication output. This signal goes 'High' for FAWB.																								
39	X OUT	0	Connected with the ceramic oscillator.																								
40	X IN	I																									
41	-	-	-																								
42	Vcc	-	Connected with SS 5V.																								

### 3-2 Camera section

#### 3-2-1 Power supply circuit

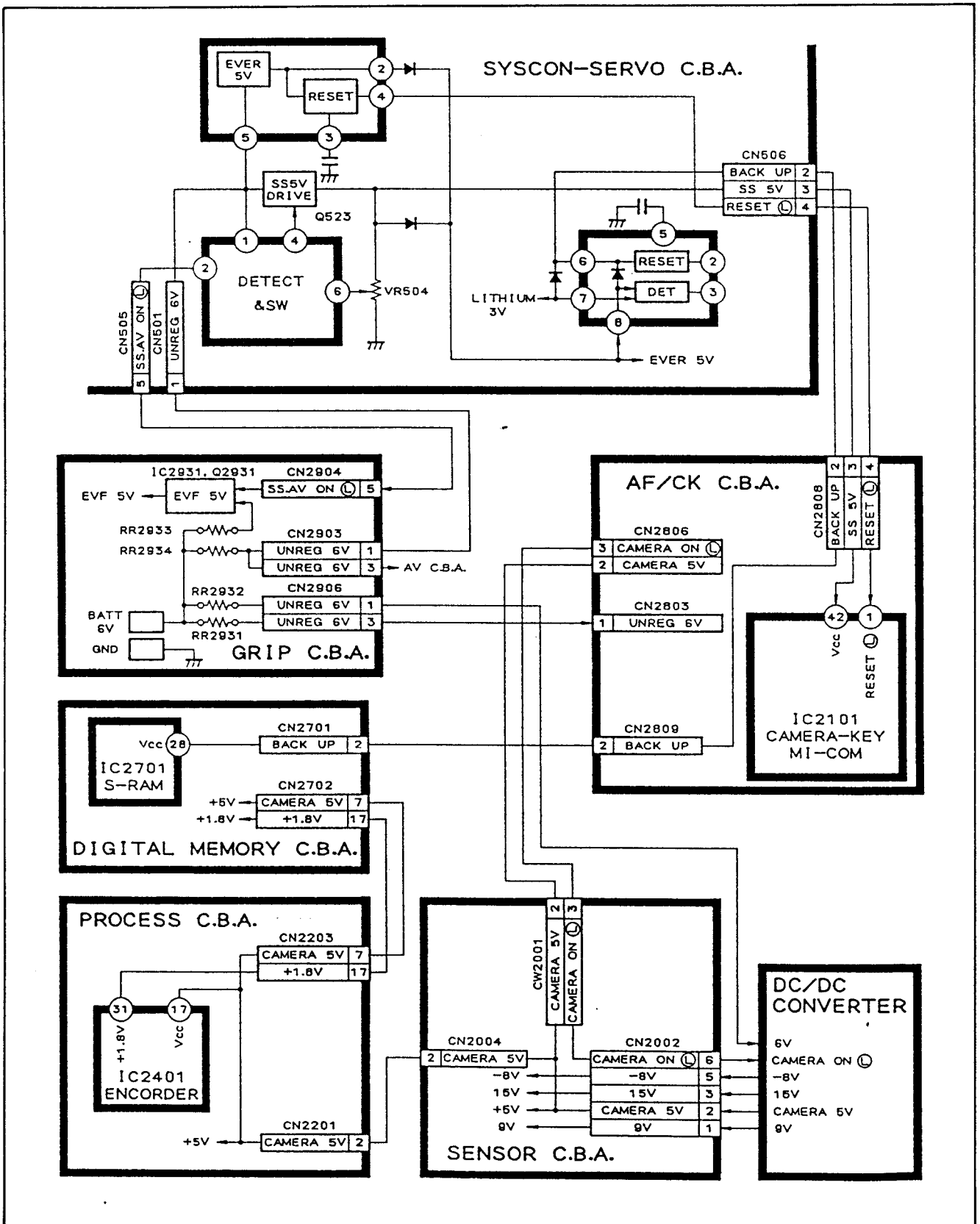


Fig. I-21

## Kinds of power sources

Fig. I-16 shows the power supply circuit scheme in the camera section. The +6V power from the battery terminal passes through the protective elements (RR2931, RR2932, RR2933, RR2934) on the GRIP C.B.A., and then it is supplied as UNREG 6V power to each circuit.

### ° CAMERA 5V (9V, 15V, -8V)

The CAMERA 5V (main power for the camera section) is generated through the DC/DC converter using the UNREG 6V power. The DC/DC converter is activated by the CAMERA ON (L) signal output from pin 25 of the CAMERA-KEY microcomputer (IC2101). It produces the CAMERA 5V power voltage and the 9V, 15V and -8V power voltages for CCD driving.

### ° EVF 5V

The EVF 5V power for the GRIP C.B.A. is generated by the regulator consisting of IC2931 and Q2931. This regulator produces 5V power when the SS AV ON (L) signal is output from pin 30 of the servo microcomputer (IC504).

### ° EVER 5V

The EVER 5V power is used for IC2701 on the DIGITAL MEMORY C.B.A. Using UNREG 6V, it is generated by IC501 on the SYSCON SERVO C.B.A. While UNREG 6V is supplied, the EVER 5V power is output continuously for backup of title and date.

### ° SS 5V

The SS 5V power is used for the CAMERA-KEY microcomputer (IC2101) on the AF/CK C.B.A. Using UNREG 6V, it is generated by IC510 and Q523 on the SYSCON-SERVO C.B.A.

### ° +1.8V

The +1.8V power is used as the reference voltage on the PROCESS C.B.A. and DIGITAL MEMORY C.B.A. Using CAMERA 5V, it is generated by IC2401 on the PROCESS C.B.A. and output from pin 31 of IC2401.

### ° LITHIUM 3V

When the 6V power supply is disconnected, the LITHIUM 3V power is fed from the lithium battery and used for backing up the DIGITAL MEMROY (IC2701).

## 3-2-2 CCD drive circuit

The basic configuration of CCD drive circuit is the same as that in the conventional model (E640).

## 3-2-3 PROCESS circuit

The basic configuration of PROCESS circuit is the same as that in the conventional model (E6).

### 3-2-4 Pin functions of CAMERA microcomputer (IC2601)

Table I-5 (1/2)

Pin No.	Signal designation	I/O	Function
1	-	-	Unused.
2	R. GAIN PWM	O	R-Y color gain control output.
3	BLC PWM	O	Auto BLC control output.
4	-	-	Unused.
5	-	-	
6	-	-	
7	KNEE PWM	O	Auto control output.
8	D3	O	Camera unit status output indicating adjustment condition in the microcomputer adjust mode.
9	D2	O	
10	D1	O	
11	D0	O	
12	GATE PULSE	O	25-area split/multi-pattern exposure-metering gate pulse.
13	FADE CONT	I	Fade control communication input.
14	S. FADE	I	Sample fade control communication input.
15	MODE SELECT	I	'High' for the E800Hi, 'Low' for the E6.
16	POWER ON FADE	I	Power-on fade control communication input.
17	V. D.	I	Sync signal input for pulse generation.
18			
19	CP2		
20	-	-	Unused.
24	-	-	
25	Vss	-	Connected with ground.
26	RESET "L"	I	Microcomputer reset input. The microcomputer is reset during the 'Low' period that comes with a lag following the CAMERA 5V power.
27	-	-	Unused.
28	X IN	I	Connected with the 10 MHz crystal oscillator.
29	X OUT	O	
30	-	-	Unused.
31	-	-	
32	Vss	-	Connected with ground.
33	-	-	Unused.
41	-	-	
42	PAL (H) / NTSC (L)	I	This signal is set to 'Low' state when the NTSC system is selected, and it is set to 'High' state when the PAL system is selected.
43	FAWB (H) / LOCK (L)	I	AWB circuit control communication input. This signal goes 'High' for FAWB operation. ('Low' for lock)
44	EVR DOWN	I	Connected with the microcomputer adjust switch.
45	EVR UP		
46	EVER SELECT	I	Connected with the channel select switch for microcomputer adjustment. This signal is set to 'High' state for R CONT, and it is set to 'Low' state for B CONT.
47	DATA SET	I	Connected with the data read switch for microcomputer adjustment.

Table I-5 (2/2)

Pin No.	Signal designation	I/O	Function
48	MODE SEL	I	Connected with the step shift switch for microcomputer adjustment.
49	ADJ. MODE	I	Connected with the adjustment mode select switch. This signal becomes 'High' when the adjustment mode is selected, and it becomes 'Low' when the normal mode is selected.
50 2 57	FADE 7 2 FADE 0	0	Video fade control output.
58 2 60	-	-	Unused.
61	Y. FL	I	Flicker detection signal input.
62	Y IRIS	I	Y IRIS signal input for BLC operation.
63	YH	I	YH signal input for auto knee operation.
64	B-Y	I	B-Y signal input for AWB operation.
65	R-Y	I	R-Y signal input for AWB operation.
66	B CONT	0	R-Y control signal for AWB operation.
67	R CONT	0	R-Y control signal for AWB operation.
68	VREF (D/A)	I	Reference voltage input for D/A conversion.
69	VREF (A/D)	I	Reference voltage input for A/D conversion.
70	Vss	-	Connected with ground.
71	Vcc	I	Connected with CAMERA 5V.
72	Vcc	I	Connected with CAMERA 5V.
73	Vss	-	Connected with ground.
74	E <sup>2</sup> PROM-CS	0	Chip select signal for serial data communication with the E <sup>2</sup> PROM (IC2602). Serial data communication is carried out while this signal is 'High'.
75	E <sup>2</sup> PROM CLOCK	0	Clock output for serial data communication with the E <sup>2</sup> PROM (IC2602).
76	E <sup>2</sup> PROM DATA OUT	0	Data output for serial communication with the E <sup>2</sup> PROM (IC2602).
77	E <sup>2</sup> PROM DATA IN	I	Data input for serial communication with the E <sup>2</sup> PROM (IC2602).
78	A. FADE	0	Audio fade control output.
79	B GAIN PWM	0	B-Y gain control signal output.
80	NC	-	-

### 3-2-5 Communication with CAMERA microcomputer (IC2601)

In Model E800Hi, the recorder-camera communication is carried out between the CAMERA-KEY microcomputer (IC2101) and the main microcomputer (IC503). The CAMERA-KEY microcomputer communicates only with the E<sup>2</sup>PROM.



### 3-3 Recorder section

#### 3-3-1 System control circuit

The system control operations are carried out primarily by the main microcomputer (IC503) and the SERVO microcomputer (IC504). The system control signals include; function key signals, mechanical switch signals, sensor signals, servo data signals, remote controller signals, etc. These signals are interpreted, analyzed and processed by the above two microcomputers for control of various operations.

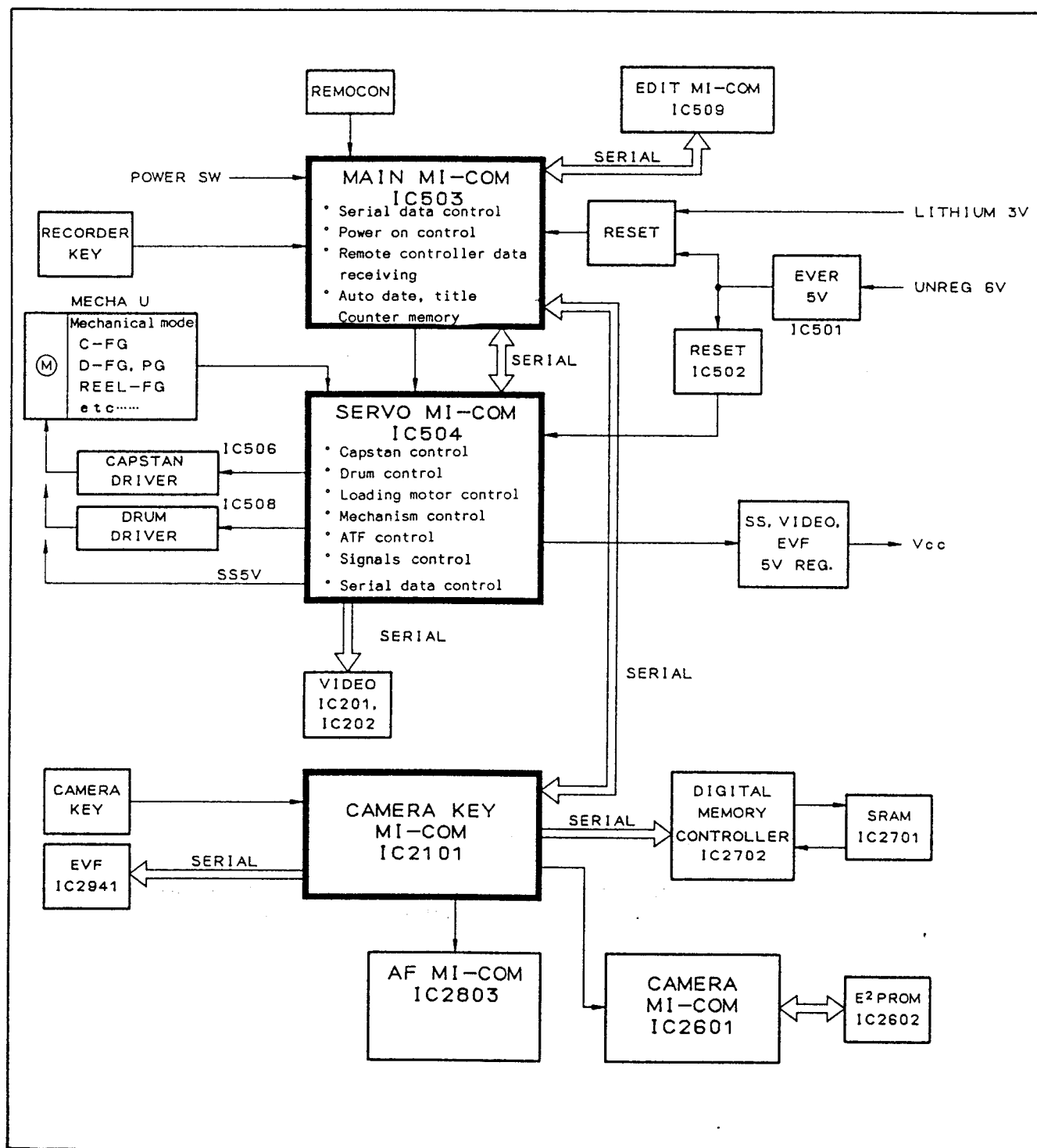


Fig. I-22

### 3-3-2 Power supply circuit

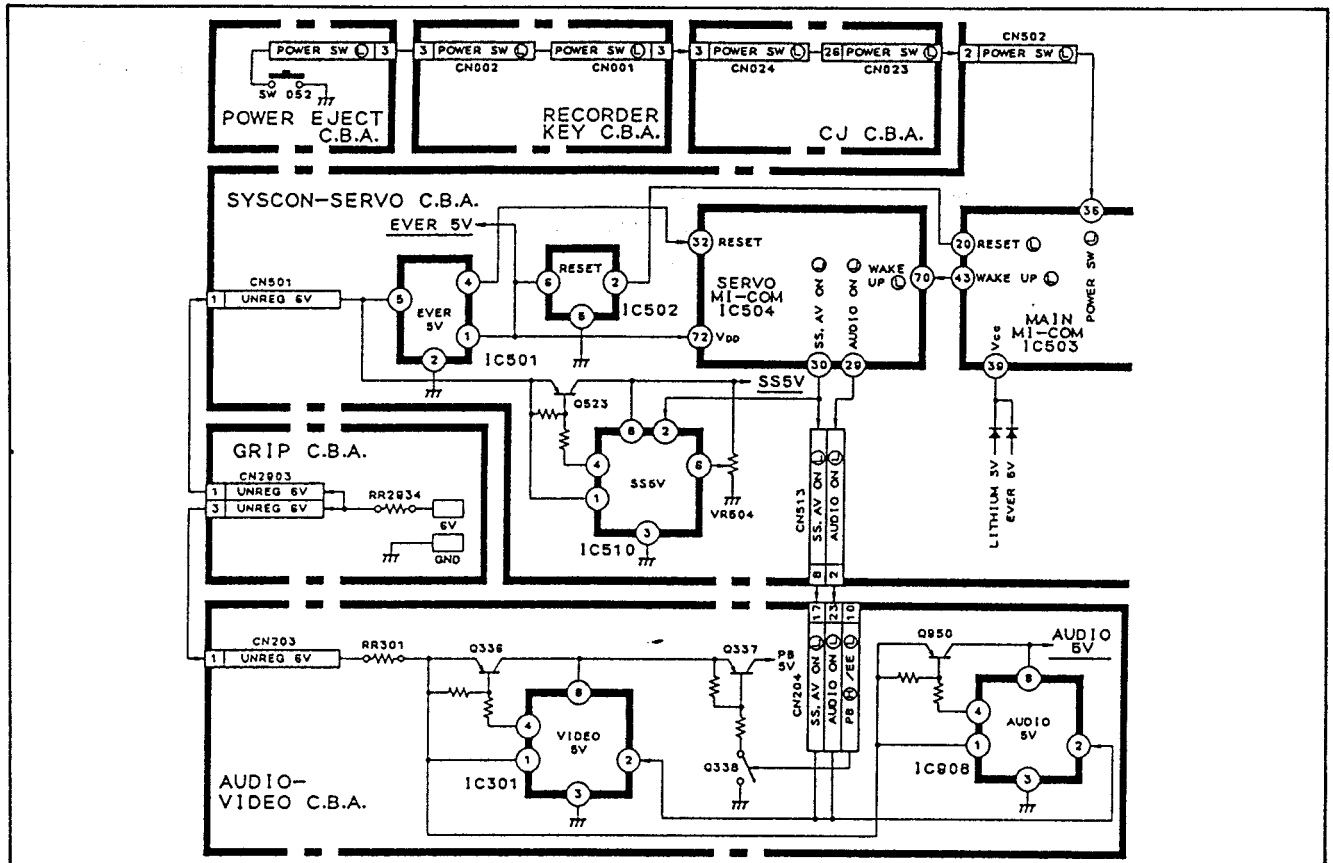


Fig. I-23

#### (1) Kinds of power sources

Power for the recorder section is produced using UNREG 6V supplied from the battery or AD adapter. Also, the 3V power of lithium battery is supplied as a backup power for the auto date function. Described below are six power sources provided for the recorder section.

##### • EVER 5V

When the battery terminal is connected with power supply, it is converted to 5V power through the three-terminal regulator (IC501) mounted on the SYSCON-SERVO C.B.A. The 6V power is constantly delivered to the microcomputer as long as the power supply is connected.

##### • SS 5V

When the POWER switch is turned on, the SS AV ON (L) signal is output from pin 30 of the SERVO microcomputer (IC504), activating IC510. The IC510 compares the check voltage (determined by VR504) with the internal reference voltage, and produces 5V constant power through control of Q523.

##### • VIDEO 5V

The sequence for VIDEO 5V generation is similar to that for SS 5V. The VIDEO 5V power is supplied to the VIDEO circuit.

##### • PB 5V

Using VIDEO 5V, the PB 5V power is output through Q337. In playback, Q338 turns on to set the base of Q337 to 'Low' level, activating Q337.

° AUDIO 5V

The AUDIO ON (L) signal activates IC908 to control Q950 (equivalent IC for VIDEO 5V). The reference voltage is not input to pin 6. Therefore, it is not required to conduct AUDIO 5V adjustment. (With pin 6 is opened, the IC can carry out control without the reference voltage.)

° LITHIUM 3V

The LITHIUM 3V power supplied from the lithium battery is used as a backup power for S-RAM (IC2701) when the 6V power supply is disconnected. When the 6V power supply is connected and turned on, the EVER 5V power is furnished to S-RAM.

(2) Power-up sequence

When the battery terminal is connected with the power supply without a lithium battery, the EVER 5V power is furnished to each microcomputer circuit from IC501 on the SS C.B.A.

For resetting the main microcomputer (IC503), the RESET signal is input to pin 20 from the reset IC (IC502). Then, on completion of initialization, the microcomputer is set to the sleep mode. In this mode, it is ready for operation. At this step, the SERVO microcomputer (IC504) is also ready in the sleep mode.

When the POWER switch is turned on, the POWER SW (L) signal is input to pin 36 of the main microcomputer. On receipt of this signal, the main microcomputer outputs the START pulse from pin 43 for activating other microcomputer circuits. When the main microcomputer reads in the POWER SW (L) signal, it gets out of the sleep mode and delivers the power control signal required for relevant operation.

### 3-3-3 Pin functions of main microcomputer (IC503)

Table I-6

Pin No.	Signal designation	I/O	Function
1	KEY OUT 2	O	Key-matrix read output.
2	KEY OUT 1		
3	KEY OUT 0		
4	KEY IN 3	I	Key-matrix read input.
5	KEY IN 2		
6	KEY IN 1		
7	KEY IN 0		
8	BATT	I	Used for detecting the excessively low voltage level. (Lithium battery)
9	TELE SW (L)	I	Zoom switch input.
10	WIDE SW (L)	I	
11	TRIG SW (L)	I	Trigger switch input.
12	VDD	I	Connected with EVER 5V. (or LITHIUM 3V)
13	CK-CS (L)	O	Allows communication with the CAMERA-KEY microcomputer.
14	SERVO-CS (L)	O	Allows communication with the SERVO/SYSCON microcomputer.
15	TALLY (L)	O	The TALLY LED indicator lights up when this signal goes 'Low'.
16	POWER LED (L)	O	The POWER LED indicator lights up when this signal goes 'Low'.
17	GND	-	Connected with ground.
18	X OUT	O	Connected with the 32.768 kHz crystal oscillator.
19	X IN	I	
20	RESET (L)	I	Microcomputer reset pulse input when the power supply is connected.
21	X OUT	O	Connected with the 4.19 MHz crystal oscillator.
22	X IN	I	
23	OP 1	I	Function check selection.
24	OP 2	I	Start-of-calendar-year selection ('90 OR '91).
25	EVER 5V (L)	I	EVER 5V detected.
26	CK-REQUEST (L)	I	Request for communication with the CAMERA-KEY microcomputer.
27	GND	-	Connected with ground.
28	GND	-	Connected with ground.
29	S-DATA IN	I	Data input for serial communication.
30	S-DATA OUT	O	Data output for serial communication.
31	S-CLOCK	I/O	Clock input/output for serial communication.
32	SERVO-REQUEST (H)	I	request for communication with the SERVO/SYSCON microcomputer.
33	NC	-	Open.
34	VDD	I	Connected with EVER 5V. (or LITHIUM 3V)
35	EJECT SW (H)	I	EJECT switch input.
36	POWER SW (L)	I	POWER switch input.
37	RIMOCON	I	Transmission code input from the remote controller.
38	VDD	I	Connected with EVER 5V. (or LITHIUM 3V)
39	VDD		
40	TCH	O	Used for clock adjustment.
41	EDIT-CS (H)	O	Allows communication with the EDIT microcomputer.
42	DISPLAY	O	Display screen on
43	WAKE UP (L)	O	SERVO/SYSCON microcomputer wake-up.
44	KEY OUT 3	O	Key-matrix output.

### 3-3-4 Pin functions of SERVO microcomputer (IC504)

Table I-7 (1/3)

Pin No.	Signal designation	I/O	Function															
1	SEL 1	0	Used for controlling the frequencies of ATF PILOT signal. <table border="1"><tr><td>PILOT</td><td>f1</td><td>f2</td><td>f3</td><td>f4</td></tr><tr><td>SEL 1</td><td>H</td><td>L</td><td>H</td><td>L</td></tr><tr><td>SEL 2</td><td>H</td><td>H</td><td>L</td><td>L</td></tr></table>	PILOT	f1	f2	f3	f4	SEL 1	H	L	H	L	SEL 2	H	H	L	L
PILOT	f1	f2	f3	f4														
SEL 1	H	L	H	L														
SEL 2	H	H	L	L														
2	SW PULSE	0	Head switching pulse output.															
3	PB (H) /EE (L)	0	PB/EE select signal. When the playback mode is selected, this signal goes 'High'.															
4	JOG (H)	0	Time constant changeover signal for the RF AGC circuit. When the accelerated/decelerated playback operation is performed, this signal goes 'High'.															
5	A-MUTE (H)	0	Audio mute signal. For audio muting, this signal goes 'High'.															
6	V-MUTE (H)	0	Video mute signal. For video muting, this signal goes 'High'.															
7	LINE (H) /CAMERA (L)	-	Unused.															
8	COMP IN (L)	0	On input of the COMP signal (pin 26), this signal goes 'Low'.															
9	Hi8 (H) /NORMAL (L)	0	Hi8/normal format select signal. When the Hi8 format is used, this signal goes 'High'. When the normal format is used, it goes 'Low'.															
10	ME (H) /MP (L)	0	ME/MP tape check input. According to the hole on cassette, it is checked whether the ME or MP tape is used. This signal becomes 'High' when the ME tape is used, and it becomes 'Low' when the MP tape is used.															
11	DRUM FWD (H)	0	Forward/reverse drive select signal for the drum motor. When the drum motor is driven in the forward direction, this signal goes 'High'.															
12	CAPSTAN TORQUE (H)	0	This signal goes 'High' when the torque of capstan motor is increased.															
13	CAPSTAN FWD (H)	0	Forward/reverse drive select signal for the capstan motor. When the capstan motor is driven in the forward direction, this signal goes 'High'.															
14	CAPSTAN ON (H)	0	Capstan motor on/off signal. This signal goes 'High' when the capstan motor turn on. It is goes 'Low' when the capstan motor turns off (braking).															
15	DRUM BRAKE (H)	0	When braking is applied to the drum motor, this a signal goes 'High'.															
16	NC	-	Open.															
17	NC	-	Open.															
18	JOG VD	0	Pseudo VD output inserted into the video signal in the, accelerated/decelerated playback operation.															
19	MODE SW2	I	Mechanical mode switch input. (3-bit configuration; for detection of mechanism position)															
20	MODE SW1																	
21	MODE SW0																	
22	CASSETTE DOWN (L)	I	Cassette compartment down switch input. This signal goes 'High' when the cassette compartment is moved up, and it goes 'Low' when the cassette compartment is moved down.															

Table I-7 (2/3)

Pin No.	Signal designation	I/O	Function
23	SAFETY TAB (H)	I	This signal becomes 'High' when the safety tab of cassette is set to the write-inhibit position (for preventing unintentional erasure).
24	HiMP (H)	I	HiMP tape check input. According to the hole on cassette, it is checked whether the HiMP tape is used. When the HiMP tape is used, this signal goes 'High'.
25	ME (L) /MP (H)	I	ME/MP tape check input. According to the hole on cassette, it is checked whether the ME or MP tape is used. This signal goes 'Low' when the ME tape is used, and it goes 'High' when the MP tape is used.
26	S (L) /COMP (H)	I	S/COMP terminal select signal. This signal goes 'Low' when the S terminal is connected, and it goes 'High' when the COMP terminal is connected.
27	TAPE SENS. LED	O	BOT/EOT detection. This signal is used whether the beginning or end of tape is reached.
28	SP (H) /LP (L)	O	Goes 'High' for changing video circuit characteristic according to tape speed.
29	AUDIO ON (L)	O	Audio power control signal. When this signal goes 'High', the audio power is turned on.
30	SS. AV ON (L)	O	SS5V/AV5V REG control signal. When this signal goes 'Low' the SS5V/AV5V REG function is turned on.
31	-	-	Unused.
32	RESET (L)	I	Microcomputer reset input. The microcomputer is reset while this signal is 'Low'.
33	Vss	-	Connected with ground.
34	X OUT	O	Connected with the ceramic oscillator.
35	X IN	I	
36	GND	-	Connected with ground.
37	GND	-	Connected with ground.
38	S-DATA OUT	O	Video serial output. Data output for serial communication with the Y PROCESS microcomputer (IC509).
39	S-CLOCK	O	Video serial clock. Clock output for serial communication with the Y PROCESS microcomputer (IC509).
40	-	-	Connected with ground.
41	S-DATA IN	I	Data input for serial communication with the main microcomputer (IC503), EDIT microcomputer (IC509), and CAMERA-KEY microcomputer (IC2101).
42	S-DATA OUT	O	Data output for serial communication with the main microcomputer (IC503), EDIT microcomputer (IC509), and CAMERA-KEY microcomputer (IC2101).
43	S-CLOCK	O	Clock output for serial communication with the main microcomputer (IC503), EDIT microcomputer (IC509), and CAMERA-KEY microcomputer (IC2101).
44	DEW (H)	I	Dew (moisture condensation) sensor input.
45	BATT. LEVEL	I	Used for detecting the excessively low voltage level of battery.
46	T REEL FG	I	Takeup-reel FG input.
47	S REEL FG	I	Supply-reel FG input.

Table I-7 (3/3)

Pin No.	Signal designation	I/O	Function												
48	STILL ADJ.	-	Unused.												
49	R-KEY	I	Recorder key input.												
50	SW POINT ADJ.	I	Used for adjusting the switching point.												
51	ATF ERROR	I	ATF error input.												
52	Vss	-	Connected with ground.												
53	VREF	I	Connected with EVER 5V.												
54	VDD	I	Connected with EVER 5V.												
55	BOT SENS. (L)	I	On detection of the beginning of tape, this signal goes 'Low' (the relevant LED indicator lights up).												
56	D-PG	I	Input terminal for drum PG signal.												
57	EOT SENS. (L)	I	This signal goes 'Low' when the end of tape is detected and LED lights up.												
58	C-SYNC	I	Sync signal input for rotation servocontrol.												
59	Hi8 DET (H)	I	Tape detection input for playback. This signal goes 'High' when the high-band recording tape is used in playback operation.												
60	D-PG	I	Drum PG input.												
61	C-FG	I	Capstan FG input.												
62	D-FG	I	Drum FG input.												
63 64	LOAD (⊖) LOAD (⊕)	0	Loading motor control signal. <table border="1"> <tr> <th>Operation Signal</th><th>LOAD</th><th>UNLOAD</th><th>BRAKE</th></tr> <tr> <td>LOAD (H)</td><td>H</td><td>L</td><td>H</td></tr> <tr> <td>UNLOAD (H)</td><td>L</td><td>H</td><td>H</td></tr> </table>	Operation Signal	LOAD	UNLOAD	BRAKE	LOAD (H)	H	L	H	UNLOAD (H)	L	H	H
Operation Signal	LOAD	UNLOAD	BRAKE												
LOAD (H)	H	L	H												
UNLOAD (H)	L	H	H												
65	VIDEO-CS (H)	0	Chip select signal for serial data communication with the Y PROCESS IC (IC201). Serial data communication is carried out while this signal is 'High'.												
66	SERVO REQUEST (H)	0	Output for serial data communication with the CAMERA-KEY microcomputer (IC2101).												
67	D-ERROR	0	Drum motor drive signal.												
68	C-ERROR	0	Capstan motor drive signal.												
69	ATF LOCK (L)	I	This signal goes 'Low' when the ATF phasing is locked normally in the ATF phase servoloop for playback.												
70	WAKE UP (L)	I	SERVO microcomputer start signal. The SERVO microcomputer is started when this signal goes 'Low'.												
71	VDD	I	Connected with EVER 5V.												
72	VDD	I	Connected with EVER 5V.												
73	Vss	-	Connected with ground.												
74	NC	-	Open.												
75	REC ON (H)	0	REC AMP control signal. This signal goes 'High' for recording.												
76	FE ON (L)	0	FE head turn-on control signal. This signal goes 'High' for erasure.												
77	S/H PULSE A	0	ATF error level hold A.												
78	S/H PULSE B	0	ATF error level hold B.												
79	ATF SW	0	ATF BPF changeover signal. This signal goes 'Low' when an ATF error is detected on f1/f3 track, and it goes 'High' when an ATF error is detected on f2/f4 track.												
80	SEL 2	0	ATF pilot signal frequency control. Refer to the description of pin 1.												

### 3-3-5 Data communication

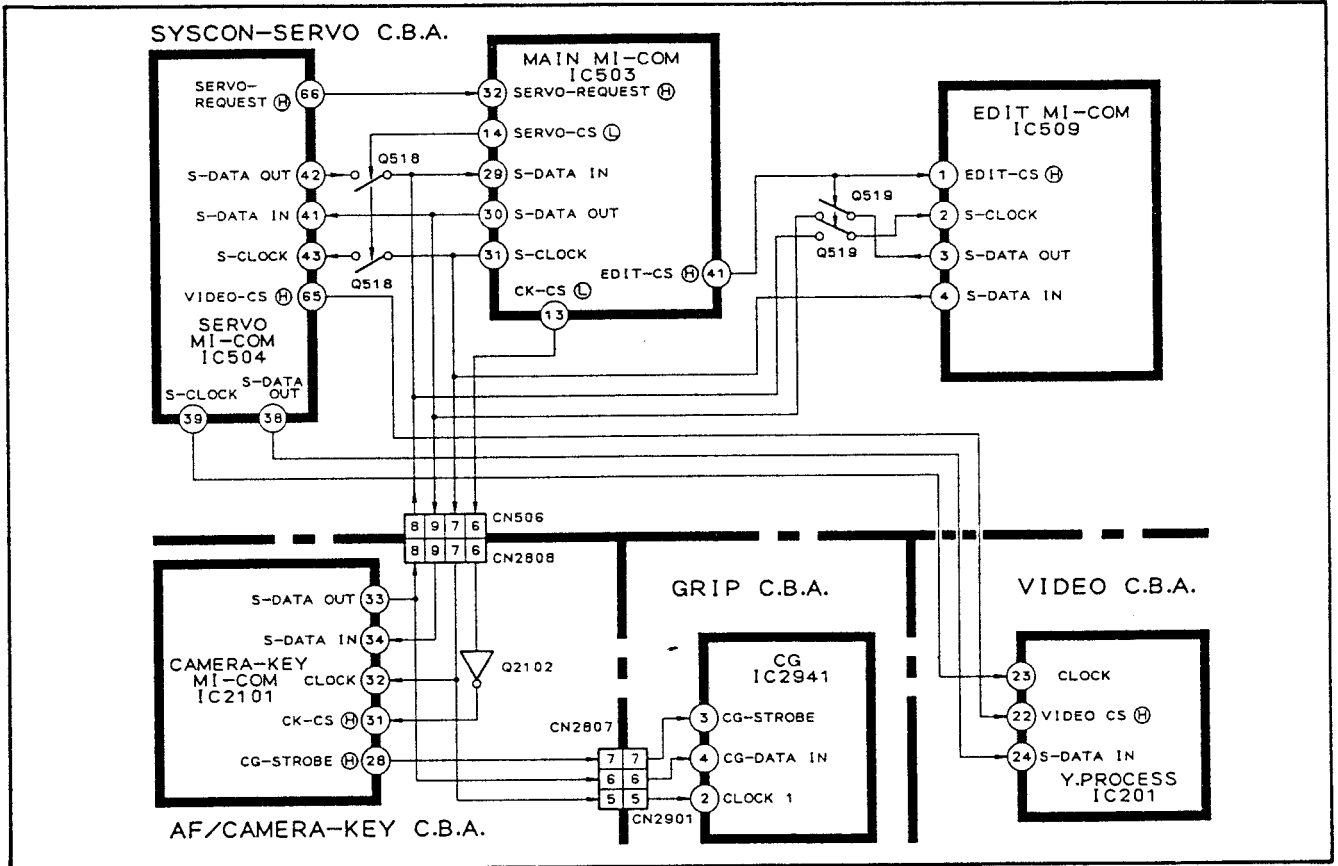


Fig. I-24

In this camcorder, the following two serial data communications are carried out:

- 1) Bidirectional communication between the main microcomputer and the CAMERA-KEY/SERVO/EDIT microcomputer.
- 2) Unidirectional communication from the camera microcomputer to the character generator and from the SERVO microcomputer to the Y PROCESS IC.

- (1) Bidirectional communication between the main microcomputer and the SERVO microcomputer

Between the main microcomputer (IC503) and the SERVO microcomputer (IC504), bidirectional data communication is performed on a basis of 8 bits x 8 words.

- 1) The SERVO microcomputer sets the SERVO-REQUEST signal at pin 66 to 'Low' level, indicating a communication request to the main microcomputer. Then, when the main microcomputer answers by issuing the SERVO-CS (L) signal within 17 msec, serial communication can be initiated.
- 2) For transmitting one word, the main microcomputer outputs eight clock pulses from pin 31. During communication, the main microcomputer supervises the state of SERVO-CS signal constantly. If this signal goes 'High', communication is terminated immediately. When 8 words are transmitted and received successfully, the communication sequence comes to the normal end.



- 3) On completion of transferring 8 words, it is checked whether the SERVO-CS signal is 'High' or not. If this signal is 'High', the SERVO-REQUEST signal is also set to 'High' level.

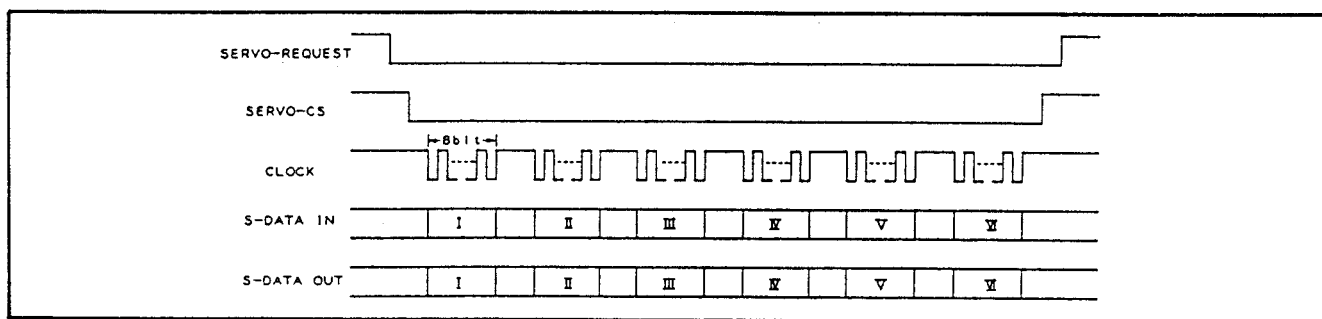


Fig. I-25

- (2) Bidirectional communication between the main microcomputer and the CAMERA-KEY microcomputer

Between the main microcomputer (IC503) and the CAMERA-KEY microcomputer (IC2101), bidirectional serial communication is performed on a basis of 8 bits x 8 words.

The camera key data is transferred to the main microcomputer to carry out various processings.

- 1) The CK-CS (L) signal is output from pin 11 of the main microcomputer. Data is transferred during the 'Low' period of CK-CS signal.
- 2) In synchronization with the clock signal output from pin 31 of the main microcomputer, data items D1 to D8 are transmitted. On completion of transmitting these data item, the CK-CS signal is set to 'High' level to indicate the end of communication.

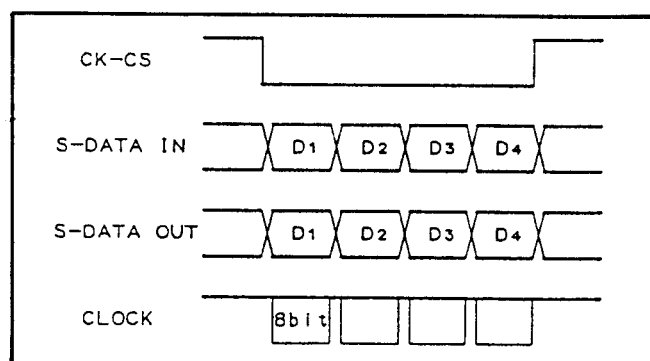


Fig. I-26

- (3) Bidirectional communication between the main microcomputer and the EDIT microcomputer

When communication with the EDIT microcomputer is required, the main microcomputer (IC503) outputs the EDIT-CS (H) signal from pin 41 for indicating a request for communication to the EDIT microcomputer. It also sets up a communication link by turning on Q519. Then, the main microcomputer sends the serial clock signal (from pin 31) and the serial data (from pin 30) to the EDIT microcomputer. Thus, communication with the EDIT microcomputer is accomplished.

- (4) Communication between the servo microcomputer and the Y-PROCESS IC communication

The servo microcomputer (IC504) also outputs the VIDEO-CS (H) and applies a serial clock and serial data to Y-PROCESS IC.

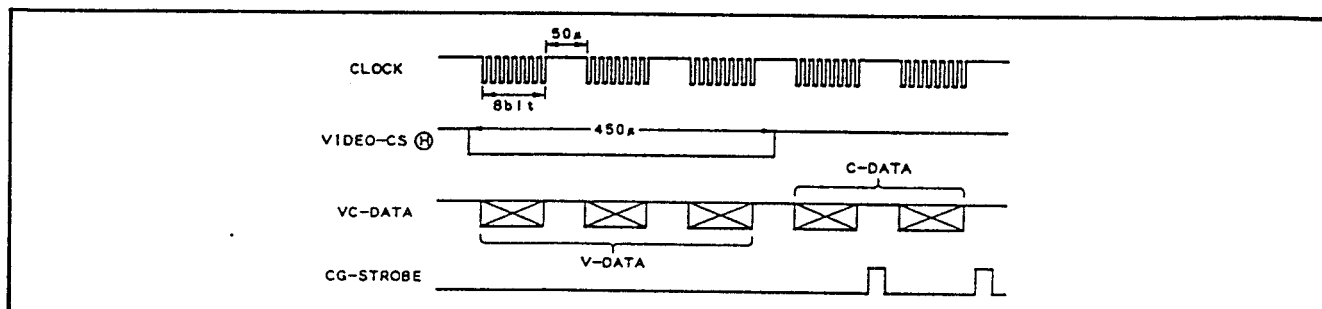


Fig. I-27

### 3-3-6 Safety functions

To prevent a physical damage or jamming of tape due to improper setting, this camcorder carries out the warning indication processing, key-input rejection, or operational restriction as mentioned below.

#### (1) Detection of decrease in battery voltage

The separate detection circuits are provided for checking the low levels of the main and lithium batteries.

##### ° Detection of decrease in main battery voltage

The following three low levels of main battery are detectable during operation.

##### (UNDER CUT 1)

When the voltage level at main battery terminal decreases below 5.65 V, the POWER LED indicator blinks and the 'BATT' warning message appears on the viewfinder screen. Under this condition, the key input and operation are not restricted (the normal operation can be continued).

If the 6V power decreases below the predetermined allowable voltage level, the low-voltage-level detecting signal at pin 45 of the SERVO computer goes 'Low' and the UNDER CUT 1 state is recognized in the microcomputer. Knowing this state, the microcomputer flashes the POWER LED indication with output at pin 16, and also indicates the warning on the viewfinder screen with the VC-DATA signal output at pin 42.

##### (UNDER CUT 2)

If the battery terminal voltage further decreases below 5.45 V, the power-off state is taken automatically through the stop state.

In the same manner as for the UNDER CUT 1 condition, the empty-level low voltage is checked by the servo microcomputer. Upon detection of the low voltage level of less than 5.45 V, the microcomputer drives the loading motor to set the mechanisms to the stop position. Then, it turns off each power control signal.

##### (SHUT-OFF)

If the main battery voltage drops rapidly below 4.5 V, the power is shut off immediately.

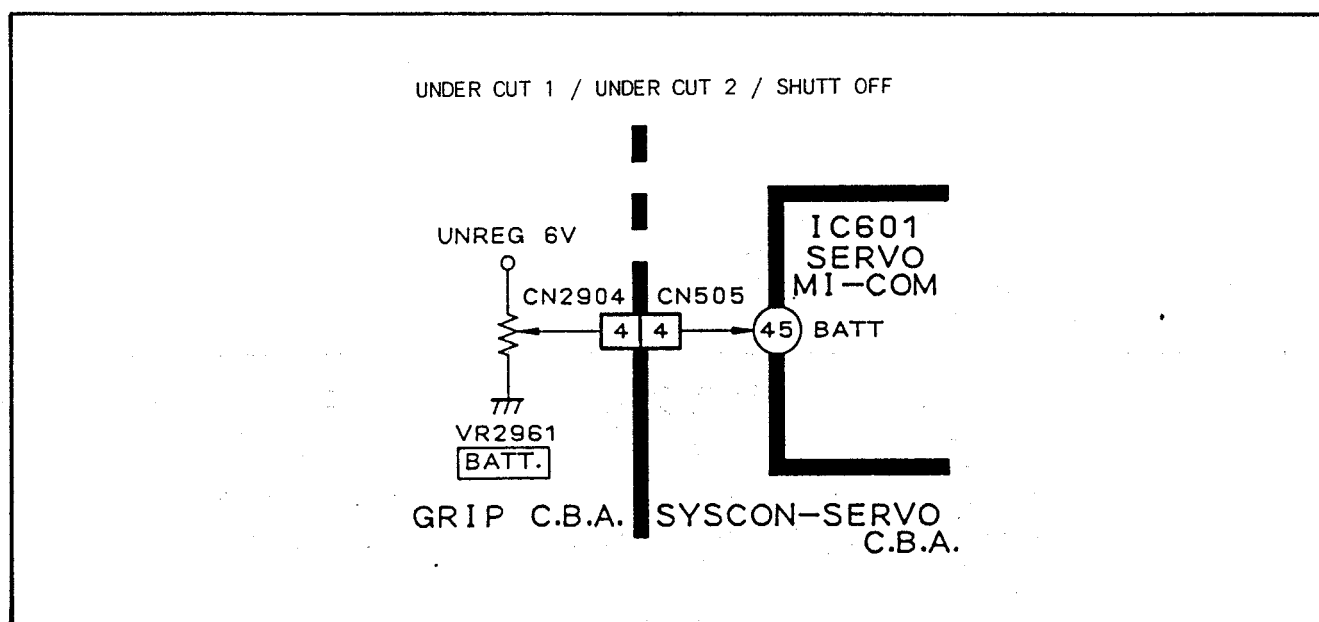


Fig. I-28

- ° Detection of decrease in lithium battery voltage

If the voltage level at lithium battery terminal decreases below approx. 2.7 V, the output of comparator IC502 goes 'Low' to let the main microcomputer know the low voltage level of lithium battery.

Knowing this condition, the main microcomputer flashes 'DATE' on the viewfinder screen to provide warning.

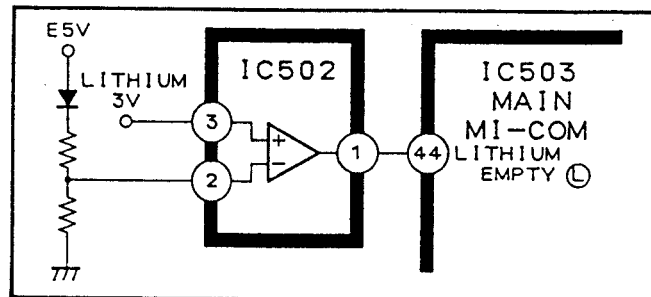


Fig. I-29

## (2) Dew condensation

The dew (moisture condensation) detecting function is provided to circumvent jamming of tape due to possible sticking.

If moisture condensation is detected during operation, the mechanism performs the 'DEW EJECT' sequence to take the unload/cassette-in state. Under this condition, only the POWER and EJECT switches are effective. Even after clearing the dew condition, other keys are not accepted unless the power is turned off or the cassette is ejected. Also, even if the cassette is inserted under the dew condition, the loading sequence is not carried out.

For warning of the dew condition, the POWER LED indicator flashes and also 'DEW' and 'EJECT' blink on the viewfinder screen.

Under the dew condition, the dew sensor equipped on the recorder mechanical chassis increases its resistance to increase the DEW detection voltage input to pin 45 of the main microcomputer. If the level of this voltage rises above the predetermined value, the microcomputer judges that dew condensation has occurred. Then, the microcomputer carries out the mode transition and provides warning indication.

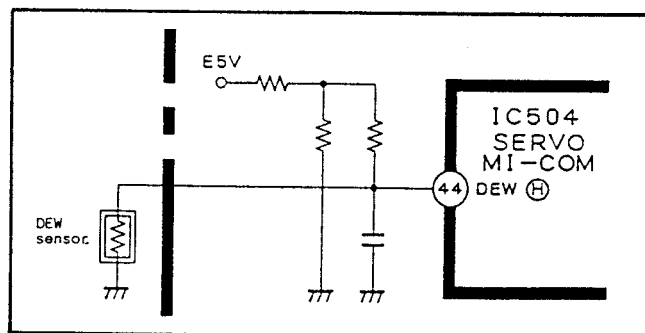


Fig. I-30

### (DEW EJECT)

If the videotape sticks to the drum, it cannot be run only with the takeup reel. In this event, the supply reel must be used also. Upon detection of dew condensation, the 'DEW EJECT' sequence is carried out as indicated in Fig. I-31.

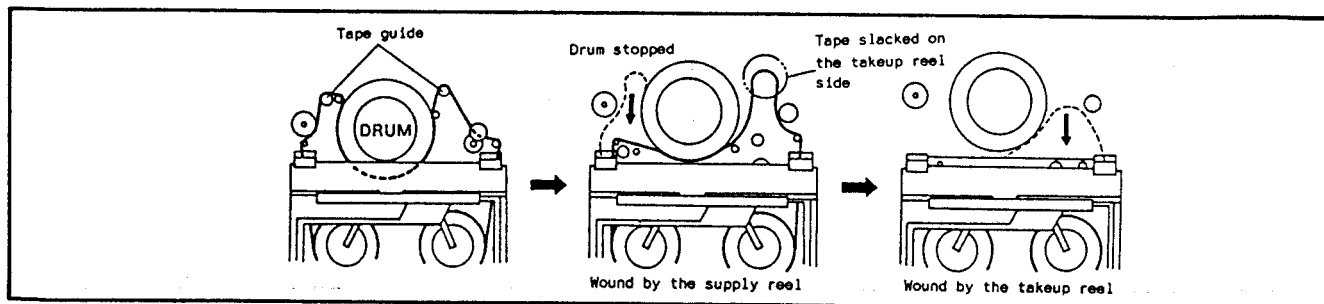


Fig. I-31

### (3) End-of-tape check

If the videotape is run up to its end, the tape guide may be damaged or the head drum may be squeezed with the tape. To prevent such an event, the end-of-tape check is conducted to detect the end of tape during operation. Upon detection of the end of tape, the tape is stopped immediately.

The end-of-tape detecting LED is turned on/off with the signal appearing at pin 27 of the SERVO microcomputer (IC504). It constantly flashes in a cycle of one msec. If the signal across pins 19 and 20 goes 'Low' twice in succession, the microcomputer recognizes the end of tape to stop the mechanism.

Also, if the EOT and BOT input signals go 'Low' twice in succession, the microcomputer judges that the cassette is not loaded. In this case, 'TAPE' blinks on the viewfinder screen.

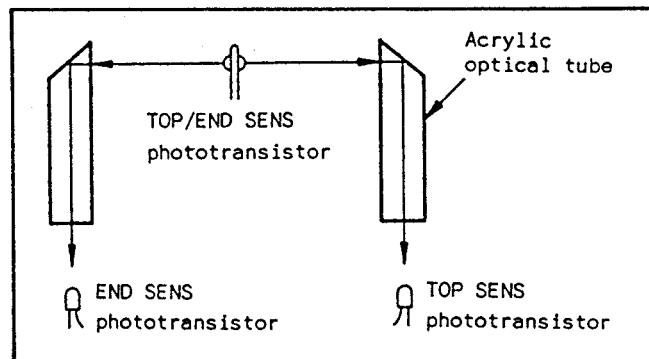


Fig. I-32

### (4) Pause timer

In the REC PAUSE or STILL mode, the head drum rotates with the tape wound around it. If this condition persists for a certain period of time, the tape may wear or the head may be contaminated with magnetic oxides. To prevent this, if the REC PAUSE state is kept for seven minutes, it is automatically changed over to the STOP mode and the power is turned off. Also, if the STILL mode is kept for seven minutes, it is automatically changed over to the STOP mode with the power being turned on.

### (5) Trouble stop (error)

Upon detection of an error, the SERVO microcomputer (IC504) puts the mechanism in the stop state. In this state, only the POWER and EJECT keys are usable. The error condition can then be reset. In the event of trouble, the POWER LED indicator flashes and 'EJECT' blinks on the viewfinder screen for warning.

Note that a capstan error is not detected since it can be found out in the reel error detection sequence.

Table I-8

Event	State	Detection
Drum error (During normal operation)	An error is issued if the drum speed decreases below approx. 50% of the normal rotation level. (For approx. 2 seconds)	Pin 61 of IC504; D-FG
Drum error (At startup)	An error is issued if the drum speed decreases below approx. 50% of the normal rotation level in two seconds after output of the DRUM PWM signal.	Pin 61 of IC504; D-FG
Reel error	An error is issued if the reel does not rotate normally. (For more than 9 seconds in the PLAY mode; For 9 accelerated speed/seconds in other state)	Pins 46 and 47 of IC504 In forward drive: T-REEL FG In reverse drive: S-REEL FG
Loading motor safety timer	An error is issued if the MODE switch remains intact for the predetermined period of time. (Mode transition operation: 3 seconds Load/unload operation : 8 seconds)	Timer in IC504; MODE switch input for pins 19 to 21

## (6) Full-top loading

To prevent the beginning of tape from getting onto the drum edge in loading, the following special sequence is performed upon detection of the beginning of tape after the cassette is inserted.

The takeup reel tenses the tape first, and then the drum motor is run in reverse slightly for approx. one second. This causes the claw on the upper drum to push the tape away to the edge of drum. And, reverse braking is applied to the drum motor to wind the tape on the takeup reel again. Thereafter, the normal loading sequence is carried out.

# 3-3-7 Servo circuit

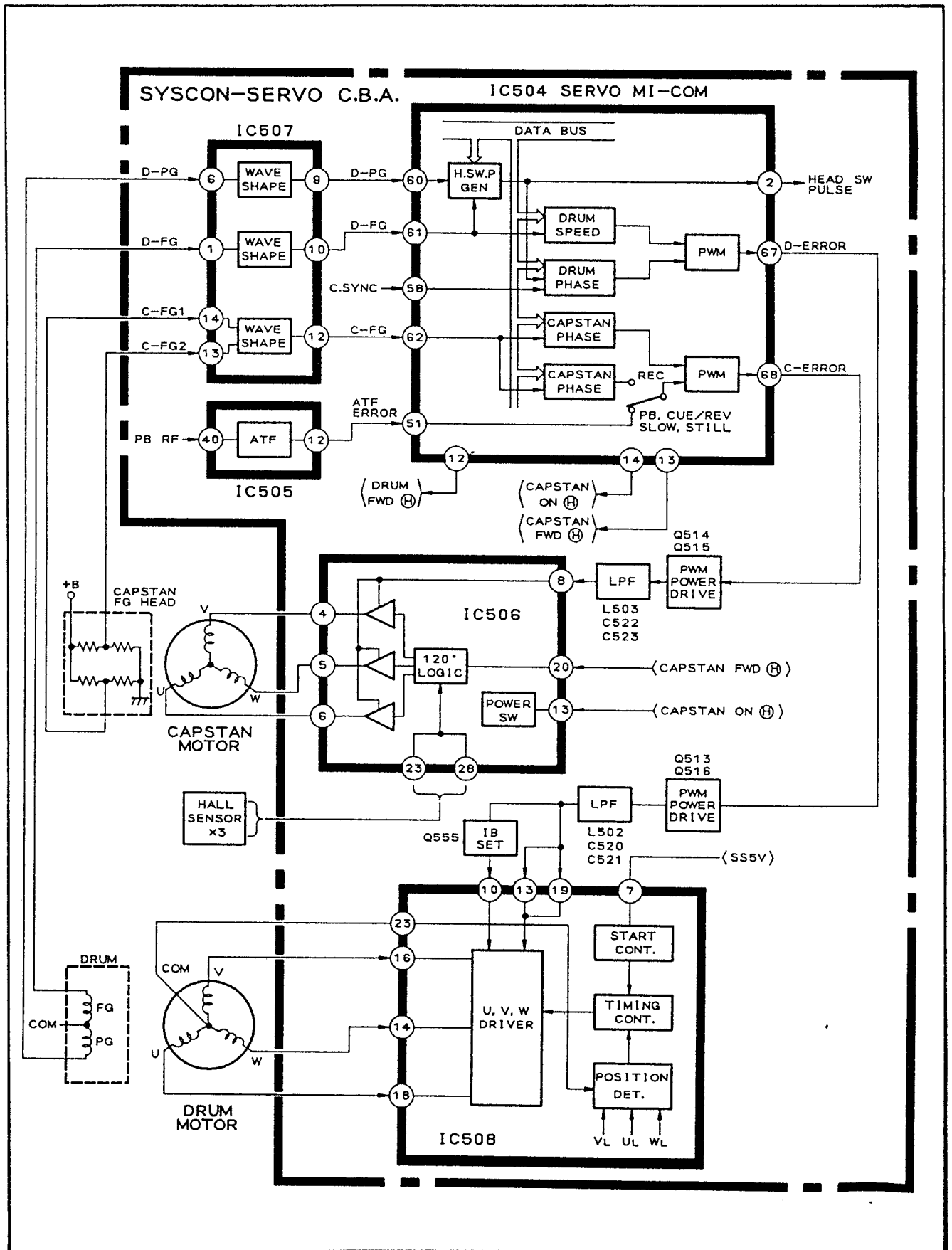


Fig. I-33

The drum and capstan servoloops are controlled under direction of the SERVO microcomputer IC504 mounted on the SS C.B.A. So, the external servocontrol circuit is not provided in this camcorder. The software servocontrol function is carried out by the servoloop hardware containing in IC504.

#### (1) Drum servocontrol

The minuscule outputs from the FG and PG coils equipped on the drum motor is subjected to waveform shaping in IC507 to provide logical levels (0 to 5 V). Then, the logical-level signals are input to the SERVO microcomputer. In recording/playback, the D-FG signal has a frequency of 600 Hz under normal condition. The D-PG signal is output at a rate of two pulses per rotation of the drum.

Using these signals, the SERVO microcomputer carries out speed servocontrol and phase servocontrol to output the D-PWM signal from pin 67. the D-PWM signal is subjected to power driving by Q513 and 516 to produce the PWM signal. It is passed through the LPF to provide DC voltage. This DC voltage is applied to the common terminal of motor. The D-PWM signal is also used to start up the motor.

The U/V/W switching of motor is conducted with the signals appearing from pins 18, 16 and 14 of the motor drive circuit (IC508). The counter e.m.f. voltage of motor is detected for switch timing control. For this purpose, pin 11 is assigned to receive input.

Starting of the motor is controlled by the D-ERROR (L) signal from the main microcomputer. Also, for braking the motor, the signals from pins 10, 13 and 19 of IC508 are used.

#### (2) Capstan servocontrol

The FG1 signal from the capstan motor and the FG2 signal having the reverse phase are subjected to waveform shaping by IC507. Then, these signals are frequency-multiplied (doubled) respectively to provide logical-level inputs to the SERVO microcomputer. In recording, the frequency is 1325 Hz (LP: 633 Hz). On receipt of these input signals, the SERVO microcomputer carries out speed servocontrol and phase servocontrol. In playback, the ATF ERROR signal input to pin 51 is used to conduct phase servocontrol. As in the drum servocontrol sequence, the C-PWM signal (result of servocontrol) is output from pin 68 and then subjected to power driving with Q514 and 515. Then, after passing through the LPF, the DC voltage is input to pin 8 of the motor drive circuit (IC506) and applied to each of motor phases U, V and W.

For the U/V/W switching of motor, the three Hall-effect elements are used to detect the rotor position. Thus, the switching operation is controlled.

Starting of the motor is controlled by the CAPSTAN ON (H) signal from the main microcomputer. Also, for braking the motor, the signal from pin 13 of IC506 is set to 'Low' level.

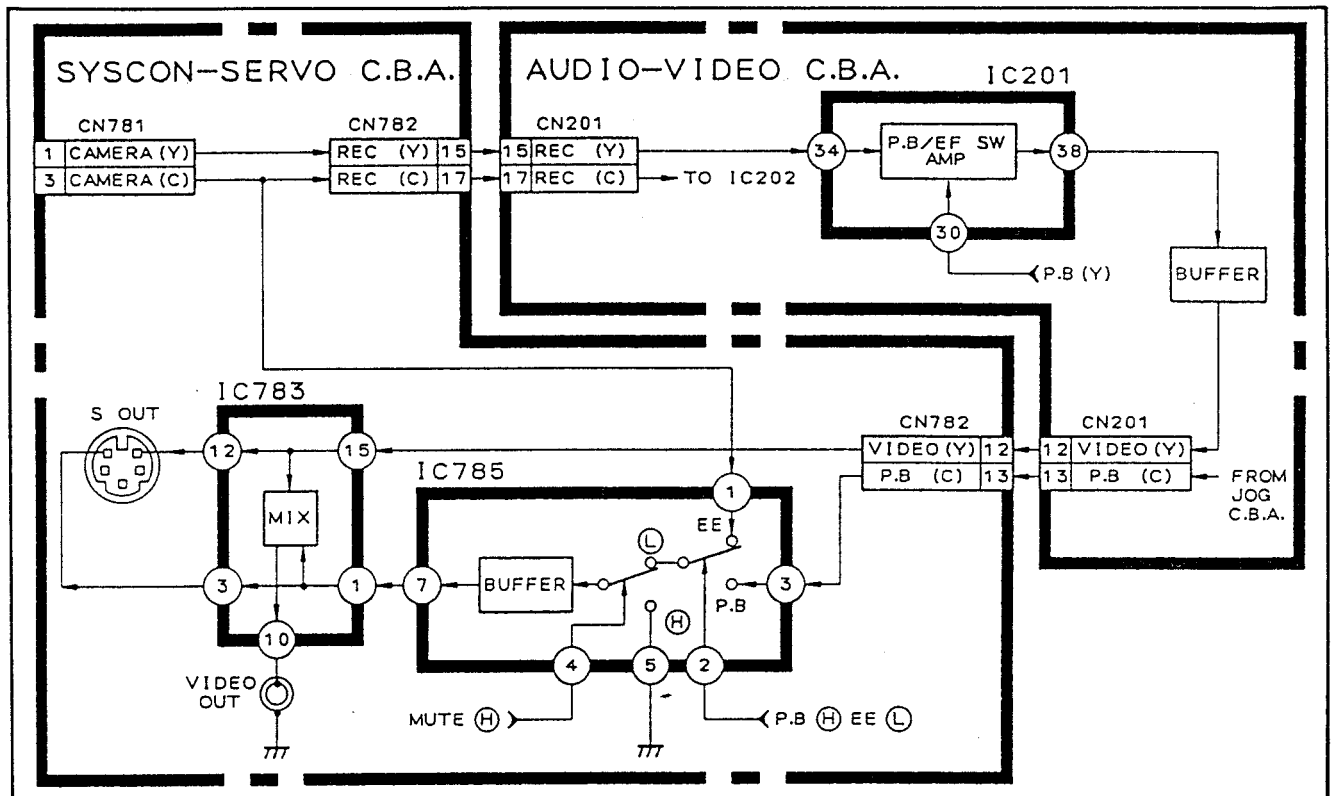


Fig. I-34

### 3-3-8 Output signal selector circuit

As shown in the Fig. I-34, the output signals of Y and C are selected by different circuits.

The followings are the brief explanation of each operation.

#### (1) Recording

The Y signal output from a camera is fed to the Audio-Video C.B.A. via the SS C.B.A. This signal is applied to pin 15 of IC783 (SS C.B.A.) again after going through the PB/EE switching circuit of the IC201.

The S-output Y signal is fed to the S-terminal from pin 12 of IC783. The composite signal is mixed in the IC783, and output from pin 10.

The C signal output from a camera is applied to pin 1 of the IC785 (SS C.B.A.). This signal is fed to the EE/PB switch and the mute circuits, and output from pin 7, then it is applied to pin 1.

The S-output C signal is fed to the S-terminal from pin 3 of IC783. The composite signal is mixed in the IC783.

#### (2) Playback

The playback Y signal is applied to the IC201 of Audio-Video circuit to be switched into PB/EE. The Y signal is fed to pin 30 of IC201, and output from pin 38.

The playback C signal is output from the JOG C.B.A. to pin 3 of IC785 (Audio-Video C.B.A.). Then, by the PB (H) signal input from the pin 2 of IC785, the signal is switched. The signal is output from pin 7 after switched in the IC. Then, the signal is output from either S-output or Video-terminal via the IC783.



### 3-3-9 Video circuit

The video circuit in this camcorder adopts the new type of ICs (IC201, 202). This configuration contributes to reduction of external circuits and ease of adjustment. Also, the power consumption is reduced by approx. 20% in comparison with the conventional circuit design.

IC201 is mainly used for luminance signal processing, and IC202 for chrominance signal processing.

#### (1) Recording

Two kinds of signals are input for recording; Y signal and C signal.

##### 1) Y signal

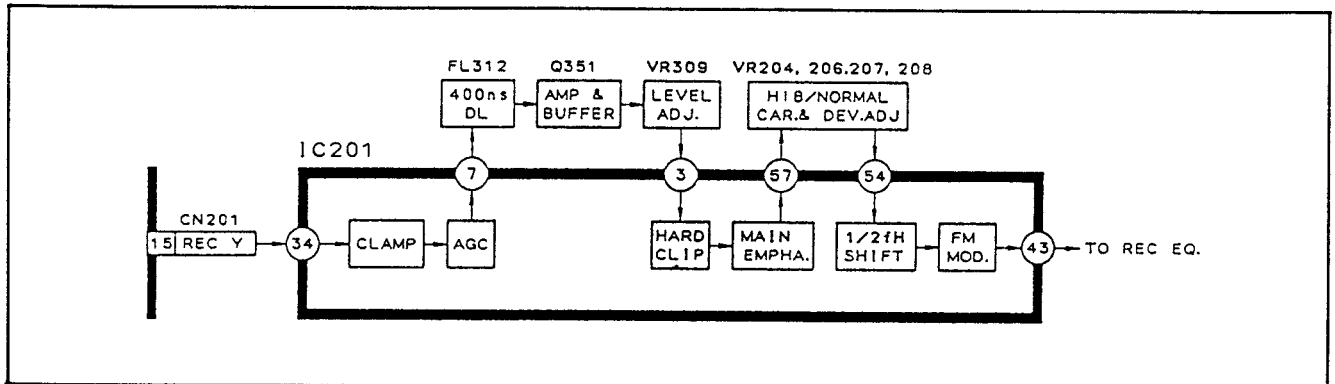


Fig. I-35

The REC Y signal input from pin 15 of CN201 is applied to pin 34 of IC201 and then it is output from pin 7 through the clamp and AGC circuits. Thereafter, for timing with the chroma signal, the REC Y signal goes through the 400 ns delay line. It is then passed through the buffer circuits for adjusting the signal level to 500 mVp-p (with respect to 100% white level). After this adjustment, the REC Y signal is input to pin 3 of IC201.

Then, after clamped, the REC Y signal is applied to the hard clip circuit for clipping off its excessive part. Through white/dark clipping, the REC Y signal is output from pin 57. It is then subjected to deviation adjustment with the Hi8/NORMAL carrier and input to pin 54. After 1/2 fH-shifted and frequency-modulated, it is output as the Y RF signal from pin 43. The output RF signal is input to the equalizer circuit for recording.

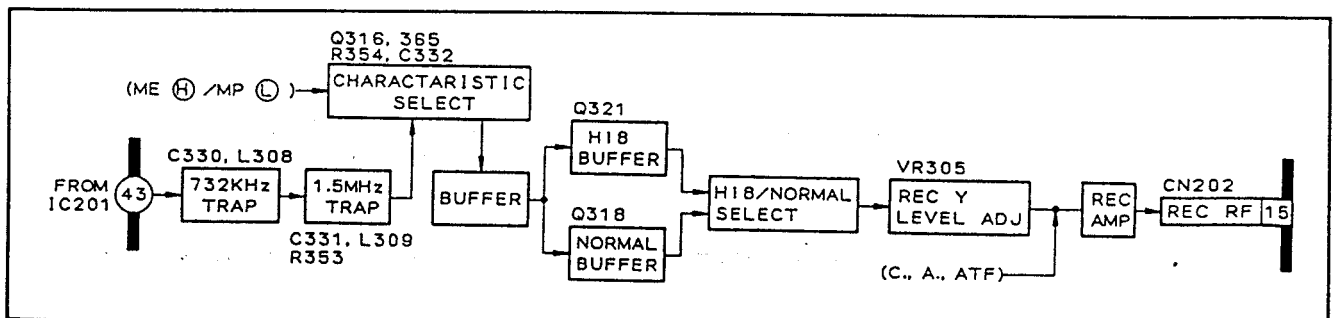


Fig. I-36

In the recording signal equalizer circuit, the audio and chroma frequency bands are eliminated through the 732 kHz and 1.5 MHz trap filters. According to the kind of tape, Q/fo changeover is made by Q316 and Q365. Then, after passing through the buffer circuit, the signal is branched into the Hi8 and NORMAL paths. When the Hi8 tape is used, the 15 MHz trap circuit is selected. Then, after level adjustment with VR305, the signal is input to the recording mixer amplifier for mixing with the chroma, audio and ATF signals. The mixed signal is then sent to the head amplifier from pin 15 of CN202.

## 2) Chrominance signal

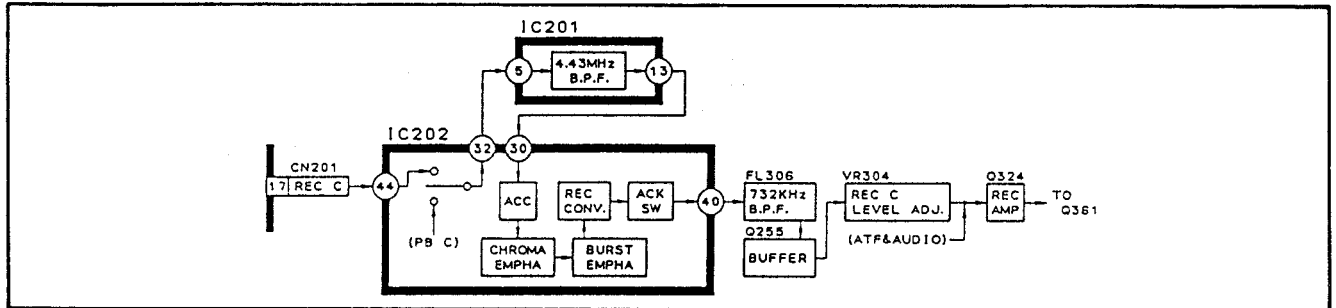


Fig. I-37

The chroma signal input from pin 17 of CN201 is applied to pin 44 of IC202 and output from pin 32 through the switch circuit. Then, the chroma signal is input to pin 5 of IC201 and passed through the 3.58 MHz band-pass filter. If the chroma signal is not passed through this band-pass filter, a timing deviation from the chroma signal on composite input takes place. The chroma signal output from pin 13 is applied to pin 30 of IC202. In this IC, the chroma signal goes through the ACC circuit, chroma emphasis circuit, burst emphasis circuit, frequency down-converter, and ACK switch circuit. Then, it is output from pin 40. The output chroma signal is fed through the 743 kHz band-pass filter and buffer, and its level is adjusted with VR304. After this level adjustment, the chroma signal is mixed with the ATF and audio signals.

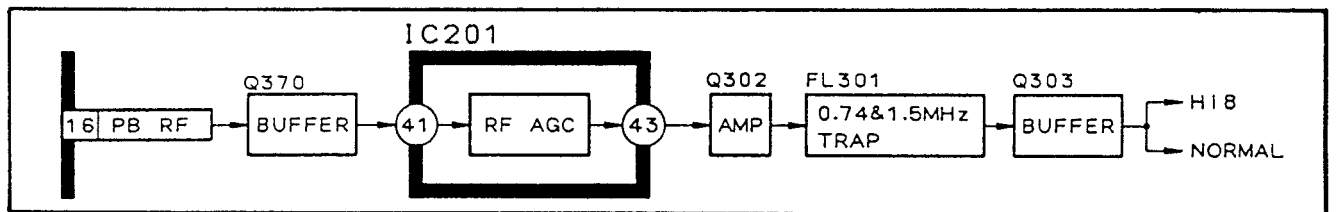


Fig. I-38

## 3) Audio signal and ATF signal

The audio signal is produced through the same processing as in Model E06.

The ATF signal is input from the SYSCON-SERVO C.B.A. via pin 18 of CN204. Then, the ATF signal is fed through the ATF low pass filter, and its level is adjusted with VR303. After this level adjustment, the ATF signal is mixed with other signals.

## (2) Playback signals

The PB RF signal is input from pin 16 of CN202. Then, it is sent to each of the Y circuit, C circuit, audio circuit, and ATF circuit.

### 1) Y signal

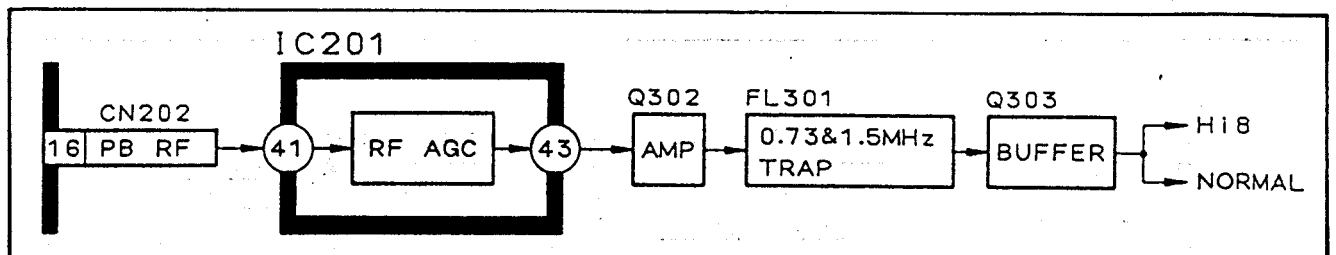


Fig. I-39

The Y signal is first input to pin 41 of IC201 and subjected to RF AGC biasing. Then, it is output from pin 43 and delivered to the RF equalizer circuit. After passing through the amplifier, 732 kHz trap, 1.5 MHz trap, and buffer, the signal is branched into the H18 and NORMAL routes.

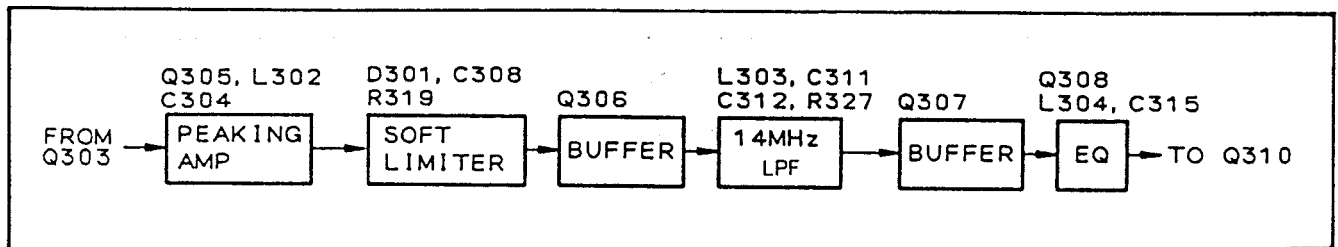


Fig. I-40

When the Hi8 tape used, the characteristic in the vicinity of 8.5 MHz is raised through the peaking amplifier. And, the signal is fed through the soft limiter, buffer, 14 MHz trap, buffer, and amplifier. Then, it is fed to Q310.

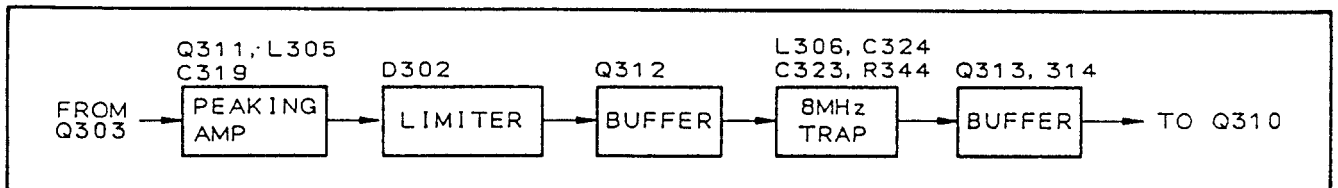


Fig. I-41

When the normal tape is used, the characteristic in the vicinity of 6 MHz is raised through the peaking amplifier, and the signal is fed through the limiter, buffer, 8 MHz trap and buffer.

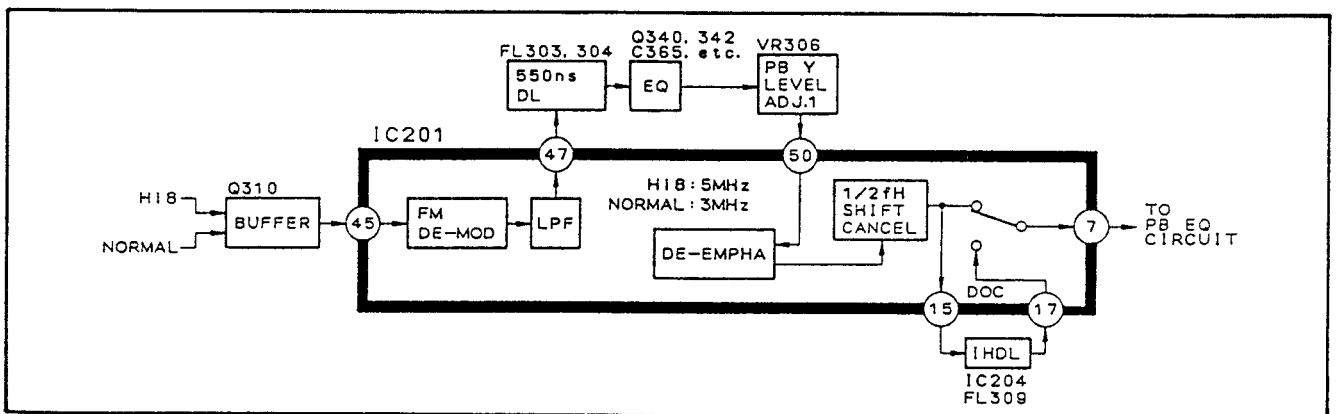


Fig. I-42

Then, these Hi8/NORMAL signals are applied to the buffer again. (Here, the signal selection for Hi8/NORMAL is conducted.) The signal is fed to the pin 45 of IC201.

The signal is frequency-modulated, lowpass-filtered, and output from pin 47. (LPF characteristic → Hi8: 5 MHz, Normal: 3 MHz). Then, it passes through the delay line (550 ns) and the equalizer circuit. It is adjusted its level (PB Y) at VR306 and input to pin 50 of IC201.

Then, it is fed to the de-emphasis circuit for half-H shift cancellation. Finally, it is output from pin 7 through the DOC circuit.

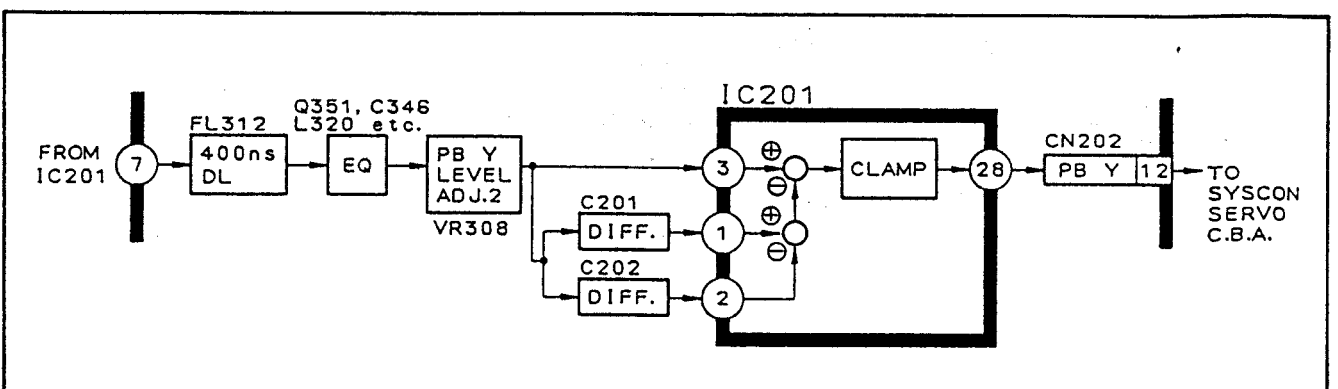


Fig. I-43

Next, the signal is applied to the equalizer circuit. First, it goes to the delay line (400 ns), is emphasized its high frequency band and adjusted its PB Y level. (It is for adjusting the 100% white level at TP201 to 1 Vp-p.) Then, the signal is input to pin 3 of IC201. Here, the noise cancel circuit is composed of the differential signals input from pins 1 and 2. Then, the signal passes the clamp circuit, pin 28, pin 12 (CN201), and then fed to the SYSCON SERVO C.B.A. as the PB Y signal.

## 2) C signal

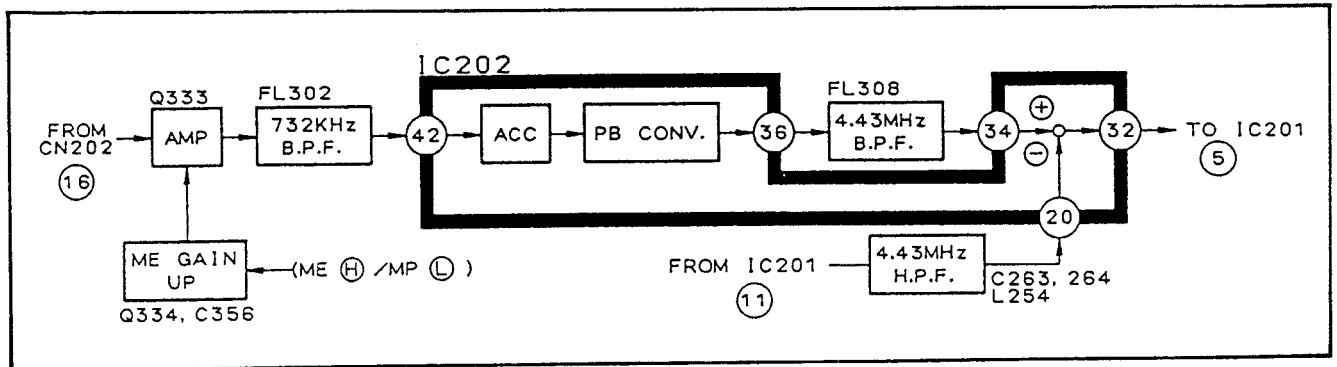


Fig. I-44

The chroma signal goes through the amplifier where a gain is adjusted according to whether the ME or MP tape is used. Then, through the 732 kHz band-pass filter, only the chroma component is extracted and input to pin 42 of IC202. After fed through the ACC circuit, the chroma component is reconverted to 4.43 MHz from 732 kHz. Then, it is output from pin 36 and fed through 3.58 MHz band-pass filter for removing unnecessary components. After this filtration, it is input from pin 34. For crosstalk elimination, subtraction is performed by the crosstalk component input from pin 20. Then, the signal is output from pin 32 and input to pin 5 of IC201. Since this crosstalk component elimination is not complete, the signal is passed through the comb filter.

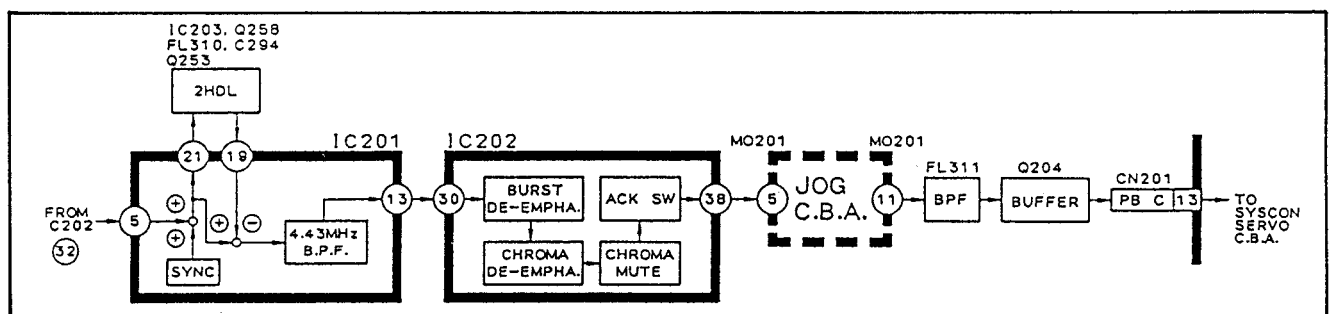


Fig. I-45

First, the pseudo-sync signal is applied. Then, the signal is output from pin 21 and returned to pin 19 over the 1H delay line. For complete elimination of crosstalk component, subtraction is performed by the original signal and the output signal is delivered from pin 13. This output signal is applied to pin 30 of IC201 and fed through the burst de-emphasis circuit, chroma de-emphasis, chroma mute circuit, and ACK switch circuit. Then, the signal is output from pin 38 and the signal is input to pin 5 of MO201 (JOG C.B.A.). Then, this signal is applied to pin 11 of MO201 again, band-pass-filtered (4.43 MHz), fed to the buffer of Q204, and then it is applied to the Syscon-Servo C.B.A. as the PB C signal from pin 13 of CN201.

## CHAPTER II. DISASSEMBLING/ADJUSTMENTS

### 1. Before Disassembling/Adjusting

#### 1-1 List of maintenance tools and supplies

##### 1-1-1 Maintenance tools

DESCRIPTION	TOOL NO.	REMARKS
Alignment tape E (MONOSCO)	DY9-1062-000	New
Alignment tape (V sweep master Hi8)	DY9-1111-500	
Recording current checker	DY9-1056-000	New
Y/C mix amplifier II	DY9-1079-001	
Extension cable kit	DY9-1107-000	
Y/C separator	DY9-1093-500	
Camera Mi-com. adjuster	DY9-1095-000	
Color bar chart	DY9-2002-000	
Logarithmic gray scale chart	DY9-2005-000	
Adjuster (0.9 mm)	DY9-2020-000	
Phillips screwdriver (bit part only)	DY9-2030-000	
Adjuster (1.8 mm)	DY9-2041-000	
Color chart viewer (5600°K)	DY9-2039-500-220	EUROPE (except U.K.), H.K. etc. U.K.
Viewer amplifier (5600°K)	DY9-2040-000-240	
ND-2.0 filter (100 x 100 mm)	DY9-2044-000	
CCA12 filter $\phi 46$	DY9-2046-000	

##### Supplies

DESCRIPTION	TOOL NO.	REMARKS
Alonalpha	CY9-8007-000	
Screw Lock 1401B	CY9-8012-000	
Grease GE-C9	CY9-8043-000	
Grease GE-X8	CY9-8044-000	
Grease GE-C4	CY9-8045-000	
Teflon Fluorocarbon Resin MP-102	DY9-3013-000	
Floil G902	DY9-3017-000	

\* Note: For recorder mechanism, refer to the mechanism manual for MC-4B (DY8-3391-501 201) separately issued.

6.	Mechanical Adjustment of Recorder Section	
6-1	Mechanical Adjustments .....	II - 39
6-2	How to drive loading motor .....	II - 39
6-3	Replacement of upper drum .....	II - 39

## 1-2 List of extension cables

Use the following extension cables.

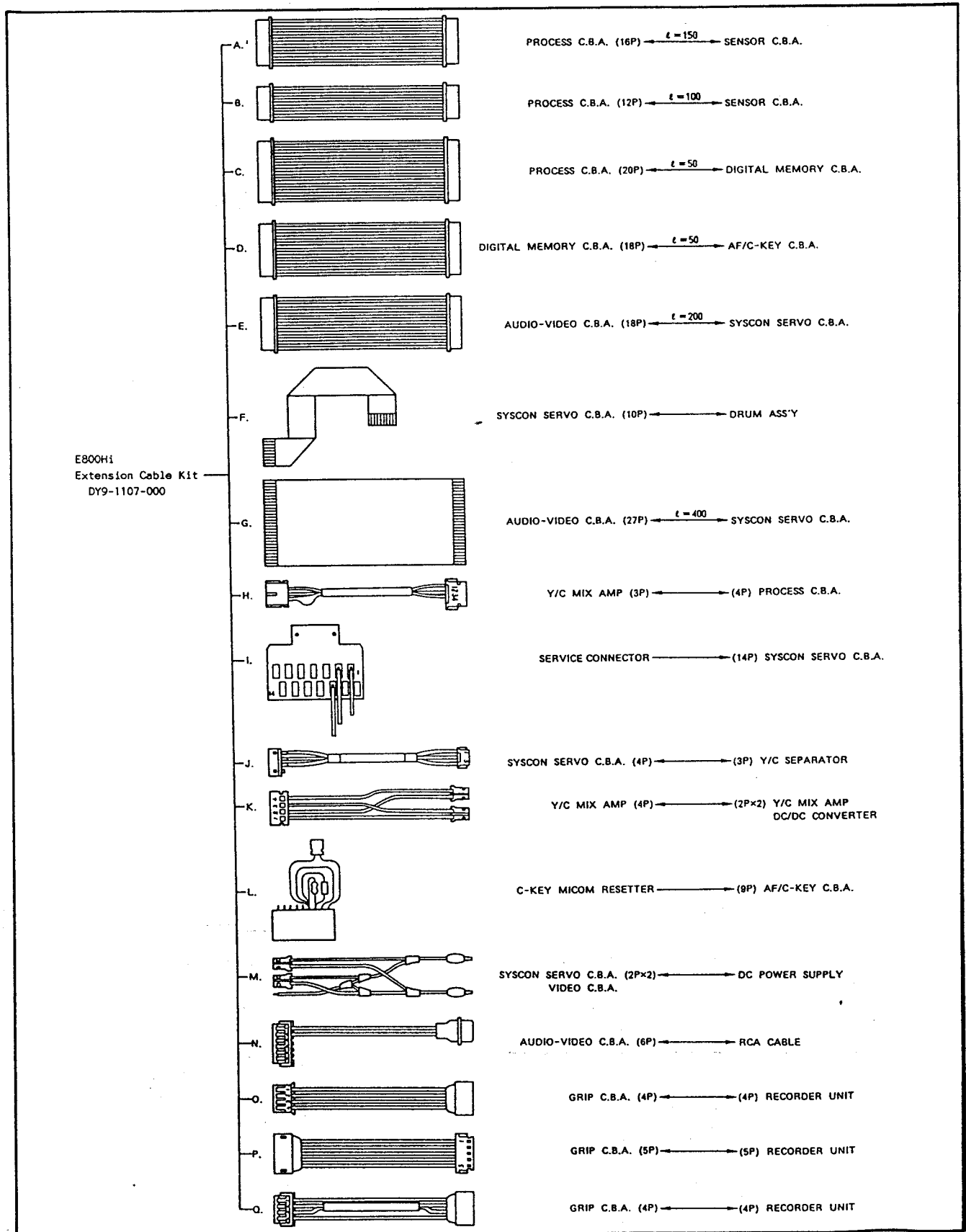


Fig. II-1

## 2. Disassembling

### 2-1 Removal/assembly of covers

#### 2-1-1 Removal of finder assembly, EVF ring, microphone and AV cap

- (1) Detach the finder assembly, EVF ring, microphone and AV cap.

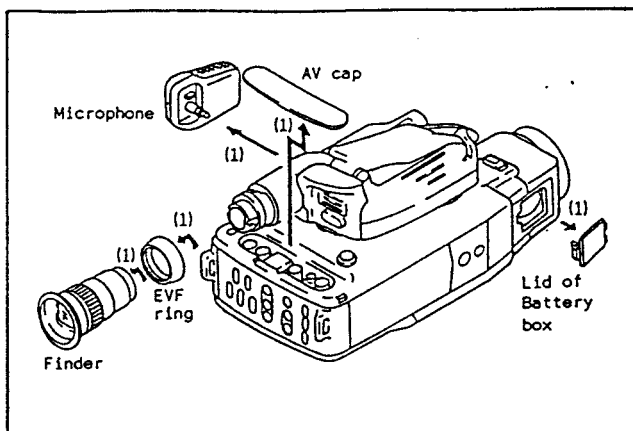


Fig. II-2

#### 2-1-2 Removal of cassette cover

- (1) To remove two screws (a), peel off two cassette cover seals.
- (2) Detach the cassette cover.

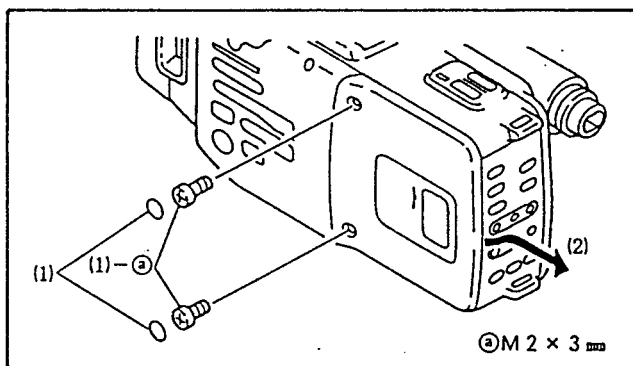


Fig. II-3

#### 2-1-3 Removal of left grip cover

- (1) Remove two screws (b) of the front side.
- (2) To remove two screws (b) of the grip rear side, turn the grip downward by 90°.
- (3) Detach the left grip cover.

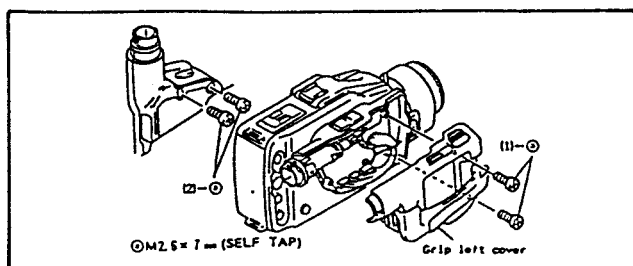


Fig. II-4

#### 2-1-4 Removal of lens cover

- (1) Remove three screws (a).
- (2) Detach a part (A) while pushing it downward.

\* Note: Do not break parts (A) and (B) when removing.

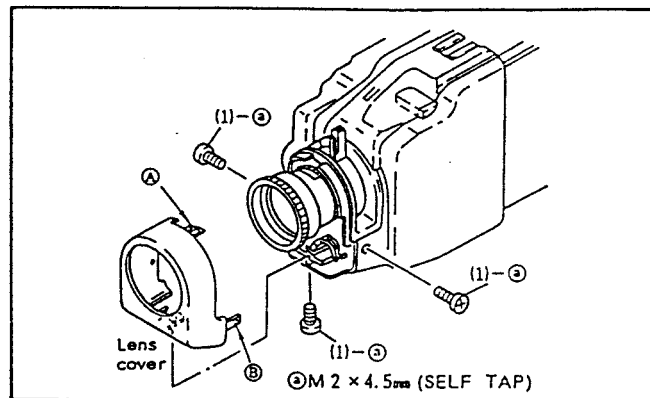


Fig. II-5

#### 2-1-5 Removal of left cover

- (1) Remove two screws (a).
- (2) Tilting the grip slantwise, remove two screws (a).
- (3) Remove two screws (b), two screws (a) and two screws (c).
- (4) Unplug five connectors between the GRIP C.B.A. and the main unit.
- (5) While pulling out the connectors from the hole of the grip, remove the left cover.

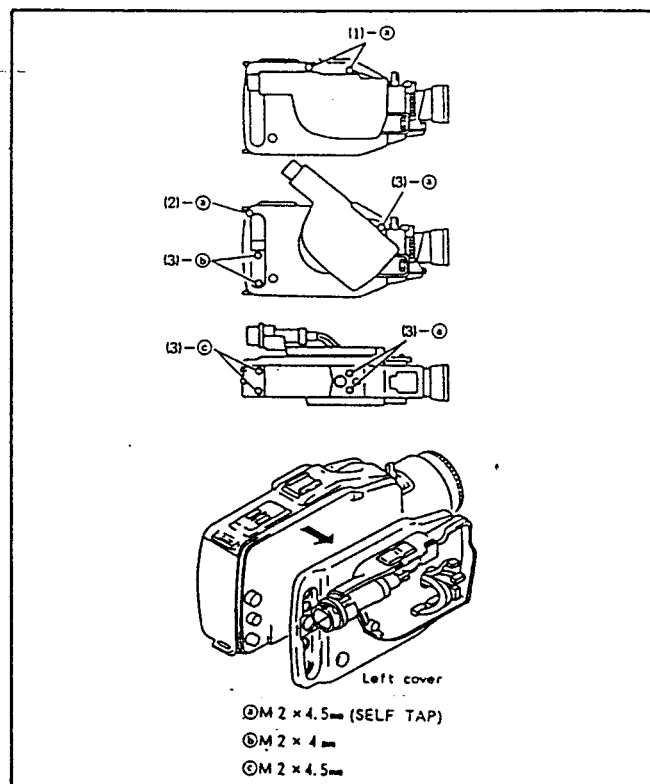


Fig. II-6



### 2-1-6 Removal of right cover

- (1) Remove two screws (a).
- (2) Remove the right cover.
- (3) Remove the upper cover.

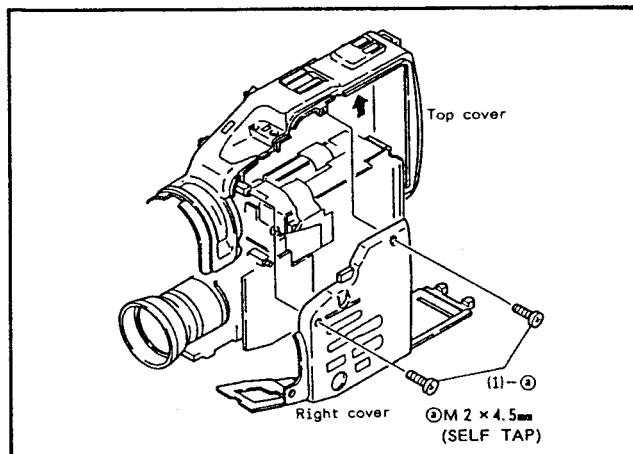


Fig. II-7

### 2-1-7 Separation of camera and recorder units

- (1) Remove the REMOCON C.B.A.
- (2) Remove the MIC C.B.A.
- (3) Remove the solder on the head amplifier.
- (4) Remove the screws (a) and (b).
- (5) Unplug CN504, 506 and 2204 between the camera and recorder units.
- (6) Separate the camera and recorder units.

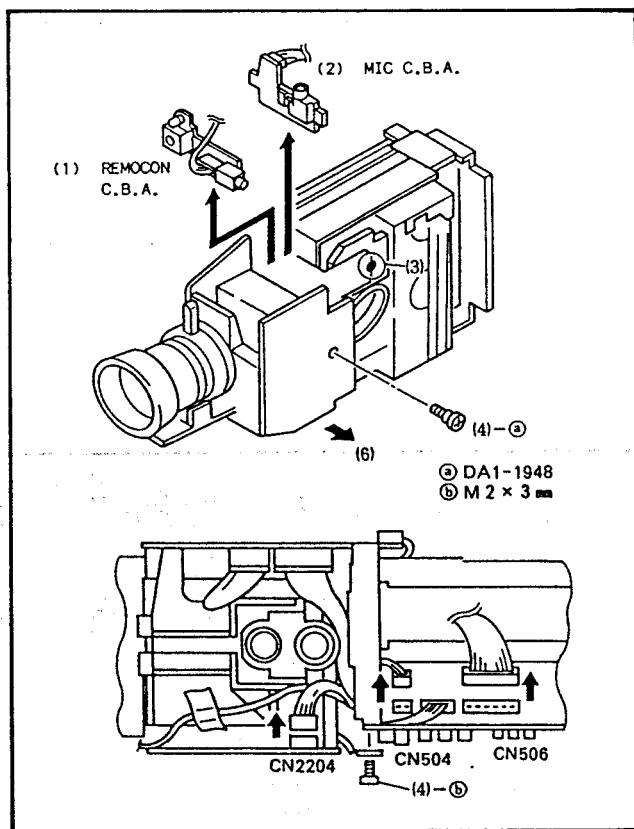


Fig. II-8

### 2-1-8 Removal of GRIP C.B.A.

- (1) Remove two screws (a).
- (2) Remove the GRIP C.B.A.

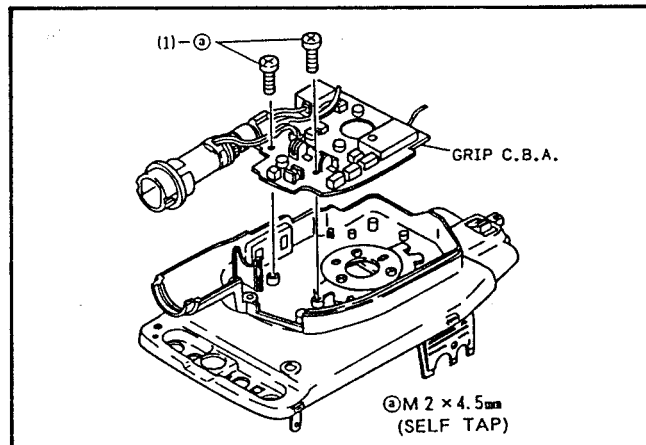


Fig. II-9

### 2-1-9 Removal of grip right cover

- (1) Remove three screws (a).
- (2) Remove the grip right cover.

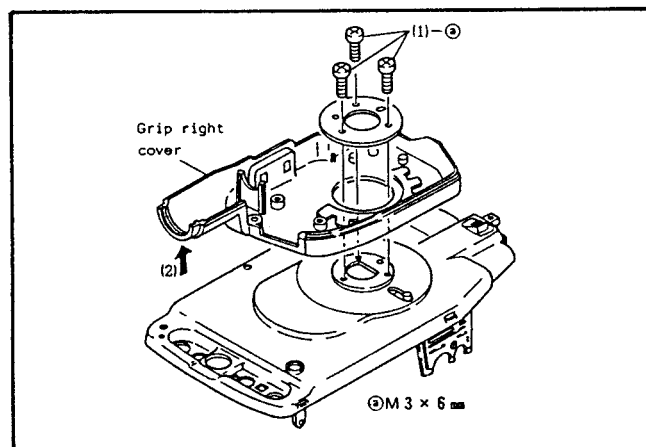


Fig. II-10

### 2-1-10 Removal of rear cover

- (1) Remove two screws (a).
- (2) Remove the rear cover.

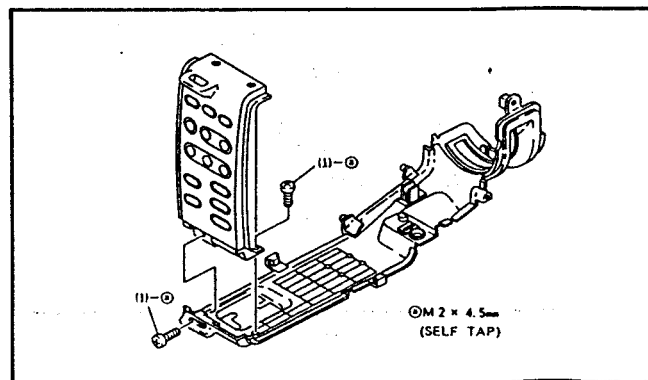


Fig. II-11

## 2-2 Disassembling of camera section

### 2-2-1 Removal of PROCESS and DIGITAL MEMORY C.B.A.s

- (1) To remove the shield plate, peel off the tape.
  - (2) Remove the PROCESS C.B.A.
- \* Note: Using a tweezers, detach three parts of board.  
Be careful not to break or deform it.
- (3) To remove the DIGITAL MEMORY C.B.A., peel off the tape securing it.

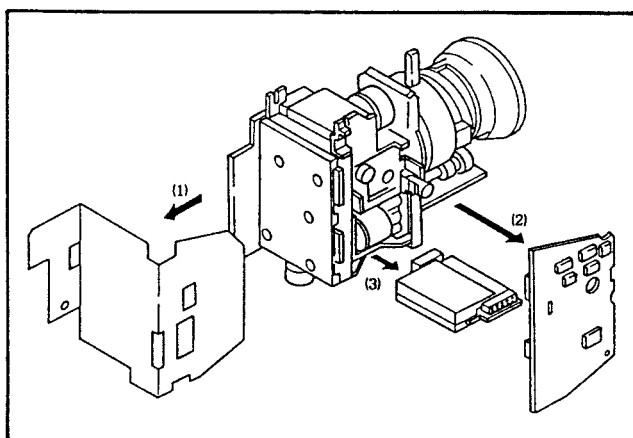


Fig. II-12

### 2-2-2 Removal of AF/CAMERA KEY C.B.A.s and DC/DC converter

- (1) Unplug the CN2801, 2802, 2803, 2804 and 2805.
- (2) To remove the AF/CAMERA KEY C.B.A.s, unhook the claw (A).
- (3) Unplug the CN2806 between the SENSOR and AF/CAMERA C.B.A.s.
- (4) Unhook the claw (B). Then, while lifting upward, detach the DC/DC converter.

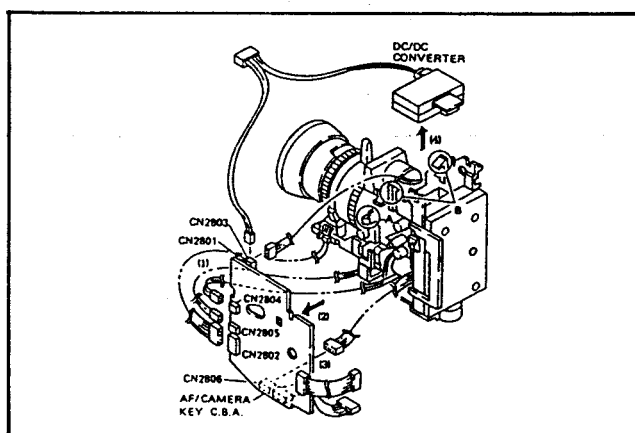


Fig. II-13

### 2-2-3 Separation of SENSOR C.B.A., CCD and lens unit

- (1) Remove the solder (three points) on the shield case 2.
- (2) Remove the shield case.
- (3) Unplug the CN2003.
- (4) Remove the solder on the CCD pins.
- (5) Remove the solder (three points) on the shield case 1.
- (6) To detach the SENSOR C.B.A., remove two screws (a).
- (7) To remove the shield case 1, remove the screw (b).
- (8) To remove the CCD retainer, remove two screws (c).  
Then, remove the CCD rubber and filter.
- (9) To detach the CCD holder, remove two screws (d).

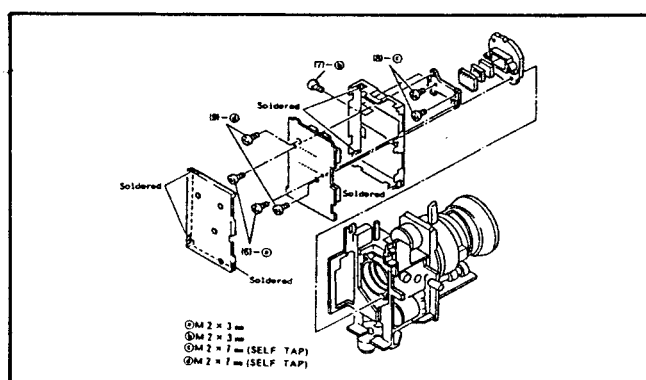


Fig. II-14

### 2-2-4 Removal of camera holder and lithium battery plate

- (1) To remove the tripod screw section, remove two screws (a).
- (2) To detach the camera holder 1, remove the screws (b), (c) and (d).
- (3) To detach the camera holder 2, remove two screws (d).
- (4) To remove the lithium battery plate, remove two screws (e).

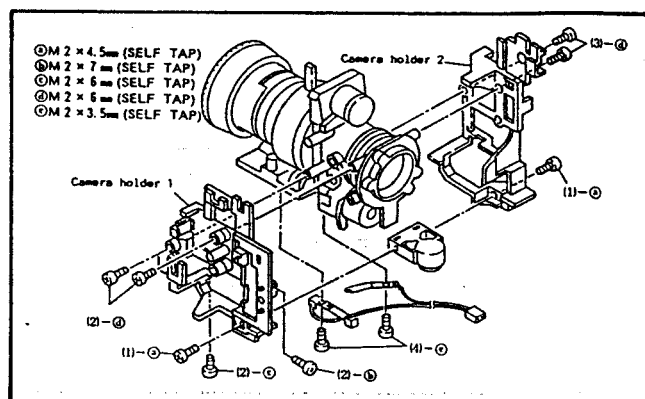


Fig. II-15

## 2-3 Disassembling of lens section

### 2-3-1 Removal of AF and PZ motors

- (1) Remove two screws (a).
- (2) Detach the AF and PZ motors.

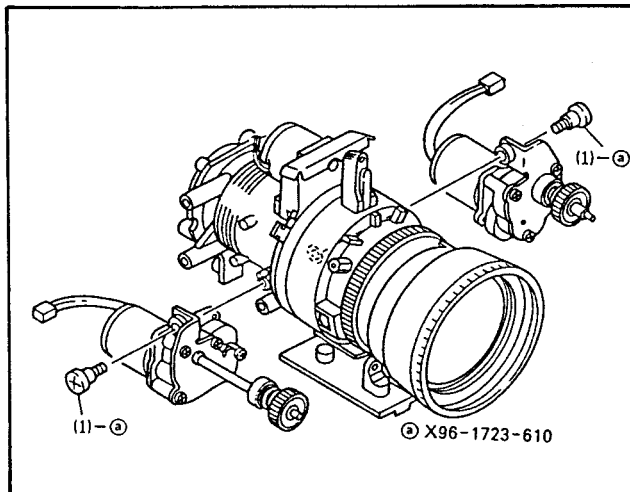


Fig. II-16

### 2-3-2 Removal of lithium holder

- (1) Remove the screws (a) and (b).
- (2) Remove the lithium holder section.
- (3) Remove a screw (c).
- (4) Separate the SW C.B.A. and the lithium holder.

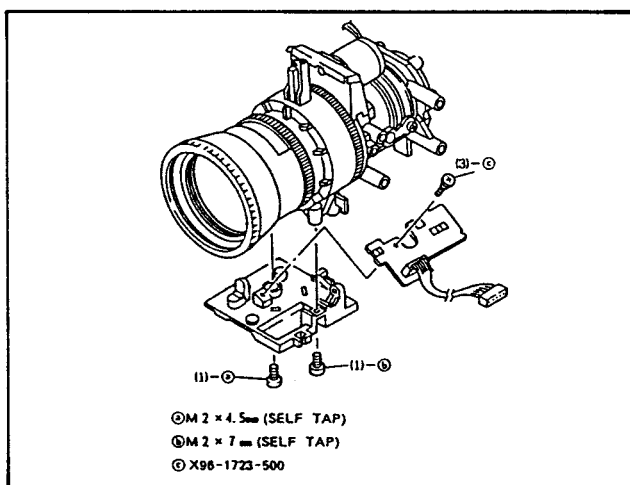


Fig. II-17

### 2-3-3 Removal of relay lens assembly

- (1) Remove a screw (r).
- (2) Detach the relay lens assembly.

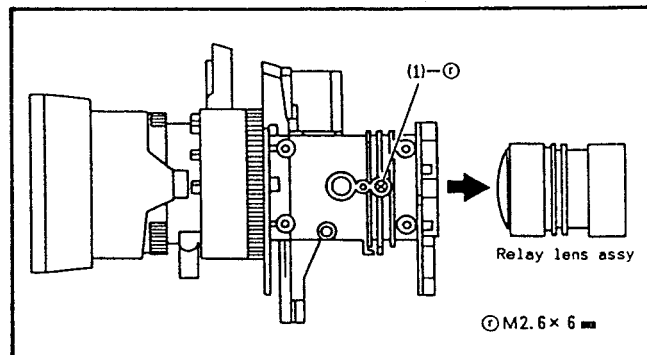


Fig. II-18

### 2-3-4 Removal of IG meter assembly

- (1) Remove a screw (a).
- (2) Detach the IG meter assembly.
- (3) Detach the IG meter cover.

\* Note: When detaching, be careful not to deform the diaphragm blades. As the diaphragm blades are likely to come off from the dowel, check that they are secured completely.

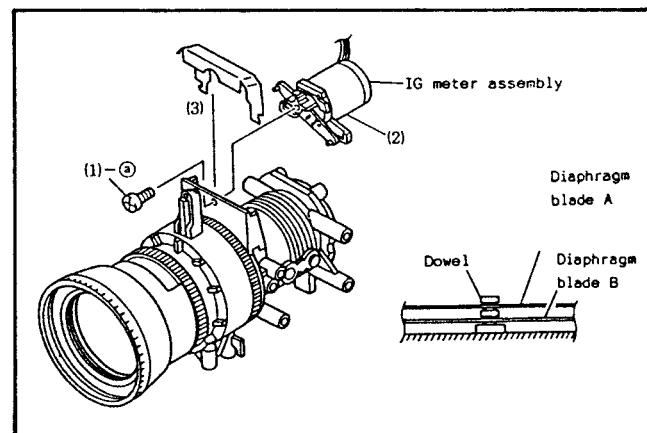


Fig. II-19

### 2-3-5 Removal of diaphragm blades A and B

- (1) Remove the IG meter.
- (2) Align the part (a) of diaphragm blade A with its dowel position, and then detach the diaphragm blade A.
- (3) Also, detach the diaphragm blade B in the same manner.

\* Notes: 1. Be extremely careful not to bend or contaminate the diaphragm blades. Also, do not touch them with bare hand or fingers.  
2. The ND filter is in the blade A.

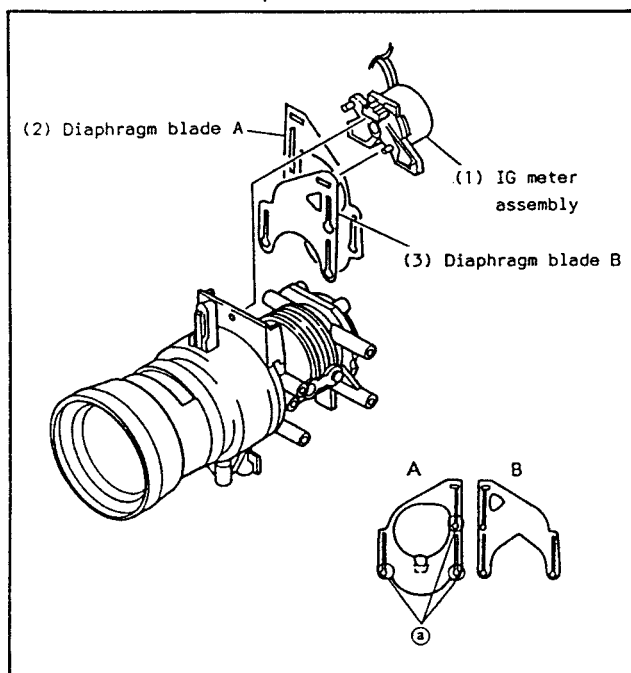


Fig. II-20

### 2-3-6 Removal of zoom sheet

- (1) Peel off the zoom sheet with a pair of tweezers or the like.

\* Note: When reattaching the zoom sheet, take care not to crease or kink it.

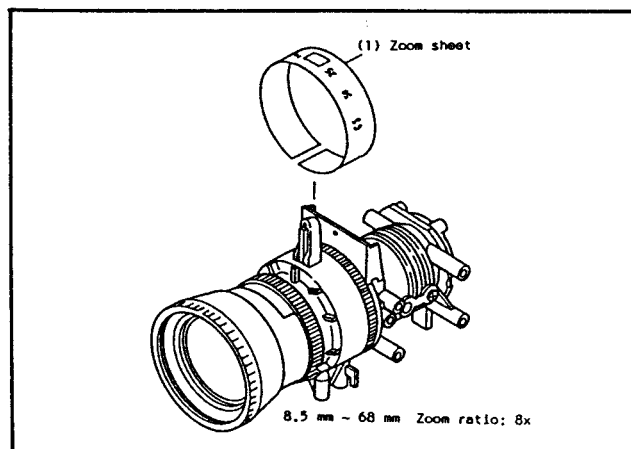


Fig. II-21

### 2-3-7 Separation of zoom section

- (1) To detach the N stopper, remove a screw (t).
- (2) Dismount the focus lens assembly.
- (3) Remove three screws (U) with the relay holder (D) and the fixed lens barrel (A) connected.
- (4) Turn the focus side up.
- (5) Set the zoom ring to the telephoto-end position. Then, pull up the fixed lens barrel (A) straight gradually.

\* Notes: 1. The cam ring (C) and the zoom ring B are detached when the fixed lens barrel (A) is pulled up straight.

2. The three guide bars and a spring are still installed into the relay holder (D) at this state.

- (6) Align the depression of fixed lens barrel A and the projection of zoom lever B (inside). Then, pull up the fixed lens barrel (A) straight.
- (7) Detach the projection of zoom ring (B) (inside) from the cam ring (C). Then, pull up the zoom ring B straight.
- (8) Remove two screws (V).

\* Note: When reassembling, check the size of screws.

- (9) Pull up the cam ring (C) straight.

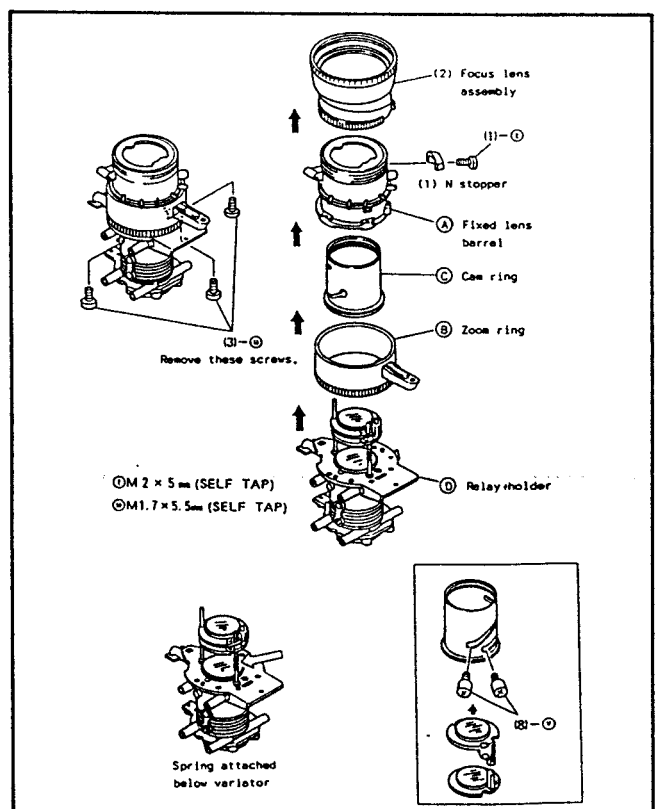


Fig. II-22

### 2-3-8 Reassembling of zoom ring

- (1) Install a compensator lens (E) to a relay holder (D), and then a variator lens (F) to it.
- (2) Put the cam ring on the relay holder.  
Then secure them with two screws (V).
- \* Note: Check that the plate springs are positioned properly.
- (3) Install the zoom ring while engaging the claw of zoom ring with the cam ring.
- (4) Mount the fixed lens barrel.
- \* Note: When mounting, set the zoom ring at the telephoto-end position. Also, set three zoom bars into the holes of fixed lens barrel completely.
- (5) Secure the relay holder and the fixed lens barrel with three screws (U).
- (6) Mount the focus lens assembly. Then, secure the (N) stopper with a screw (t).
- (7) Perform the operational checks and the AF distance measuring adjustment.

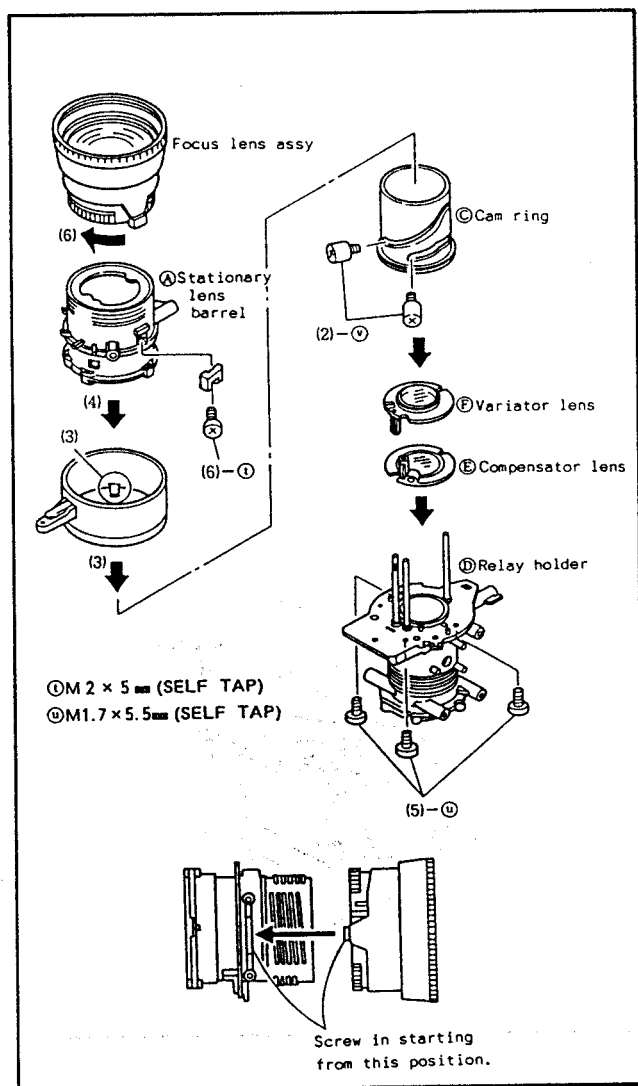


Fig. II-23

### 2-3-9 Oil/grease/bond application positions

After cleaning, replacement, etc., apply the followings to the indicated positions in the Fig. II-24.

- ① Grease GE-X8 (CY9-8044-000)
  - ② Grease GE-C4 (CY9-8045-000)
  - ③ Instantaneous adhesive Alonalpha (CY9-8007-000)
  - ④ Floil G902 (DY9-3017-000)
  - ⑤ Teflon Fluorocarbon Resin MP-102 (DY2-3013-000)
- Gease GE-C4 (CY9-8045-000)  
Use the above MP-102 with GE-C4.  
Weight ratio is as follows.  
MP-102 : GE-C4  
3 : 10

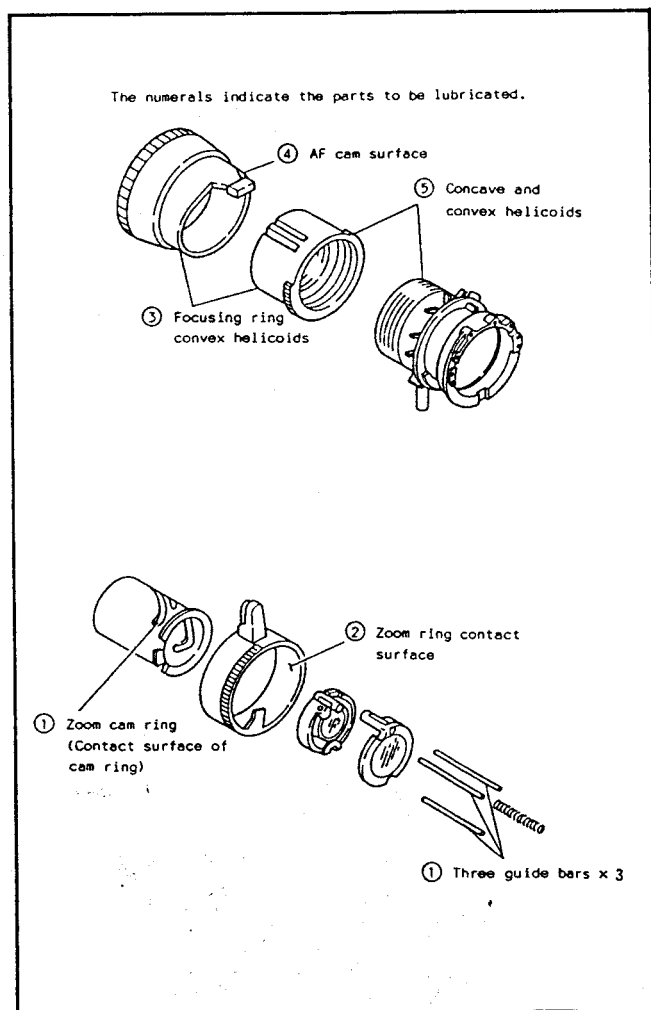


Fig. II-24

## 2-4 Disassembling of recorder section

### 2-4-1 Removal of P/E-KEY, RECORDER-KEY and VIDEO C.B.A.

- (1) Remove the screws (a) and (b).
- (2) To detach the P/E-KEY C.B.A., unplug the CN002.
- (3) To detach the RECORDER-KEY C.B.A., unplug the CN001.
- (4) Unplug the CN202, 204 and 205.
- (5) Detach the VIDEO C.B.A.

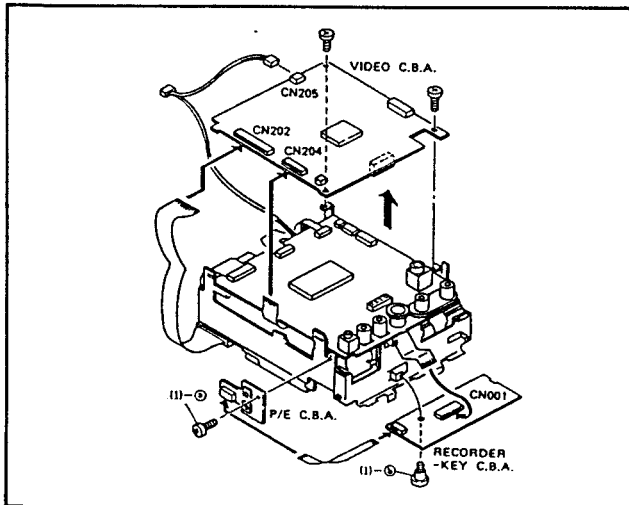


Fig. II-25

### 2-4-2 Removal of SYSCON-SERVO C.B.A.

- (1) Unplug the CN508, 509 and 510.
- (2) Remove two screws (a).
- (3) Open the SYSCON-SERVO C.B.A.
- (4) To detach the SYSCON-SERVO C.B.A., unplug the CN502.

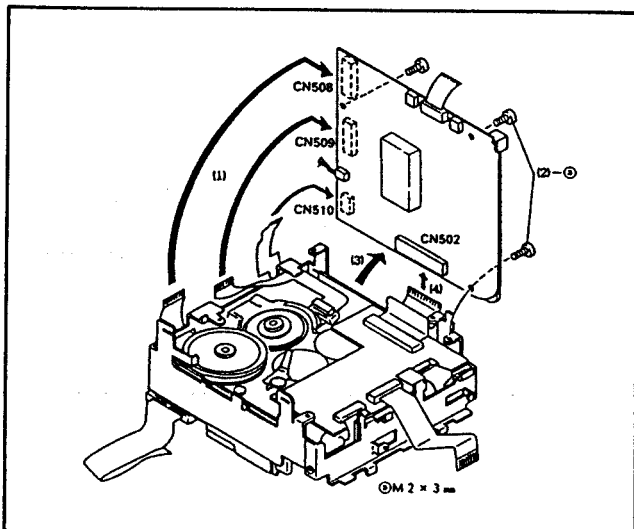


Fig. II-26

### 2-4-3 Removal of CJ C.B.A. and connectors

- (1) Unplug the CN021 and 022.
- (2) To remove the CJ C.B.A., remove the screw (a).
- (3) Unplug the capstan connector.
- (4) Unplug the loading motor connector.
- (5) Unplug the drum motor connector.

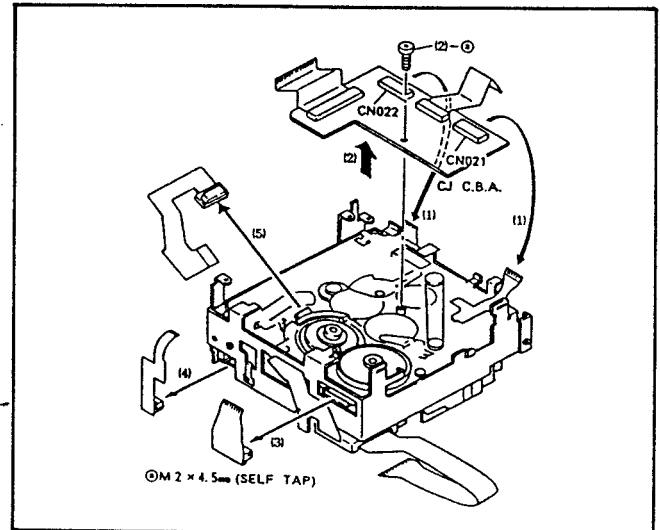


Fig. II-27

### 2-4-4 Removal of head amplifier and recorder holder

- (1) Unplug the head amplifier connector.
- (2) Remove the screw (a).
- (3) Remove the head amplifier assembly.
- (4) Remove two screws (b) and (c).
- (5) Remove the recorder holder 2.
- (6) Remove the screw (d).
- (7) Remove the recorder holder 1.

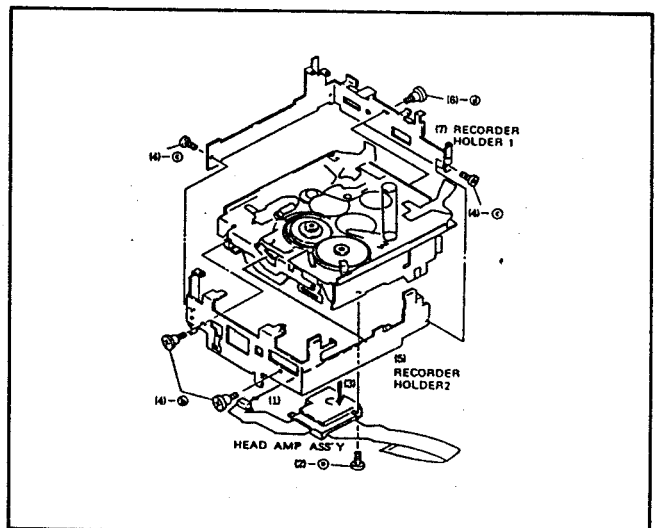


Fig. II-28

## 2-5 Wirings

### (1) CJ C.B.A.

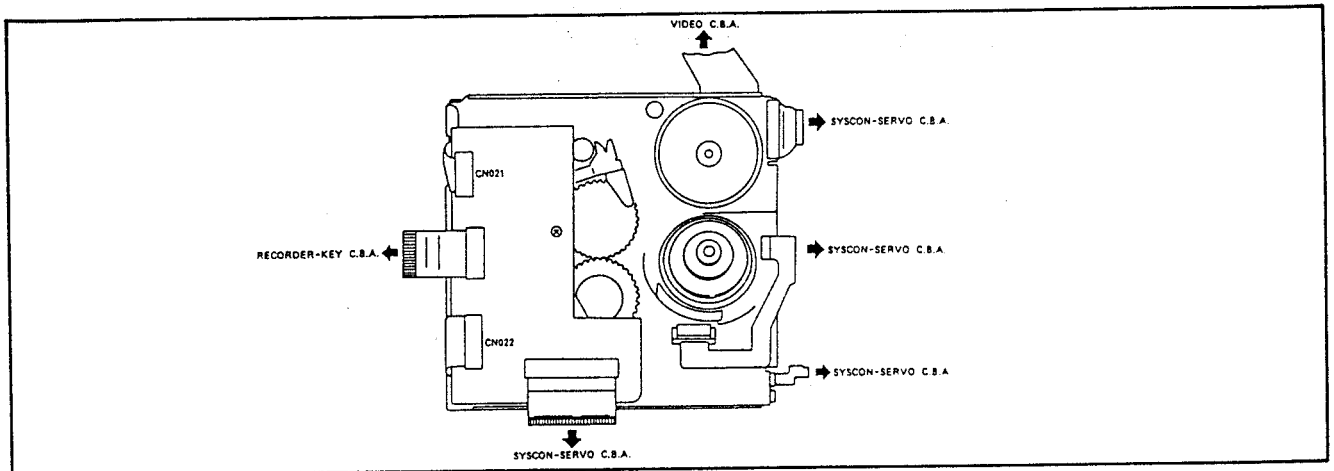


Fig. II-29

### (2) SYSCON-SERVO C.B.A.

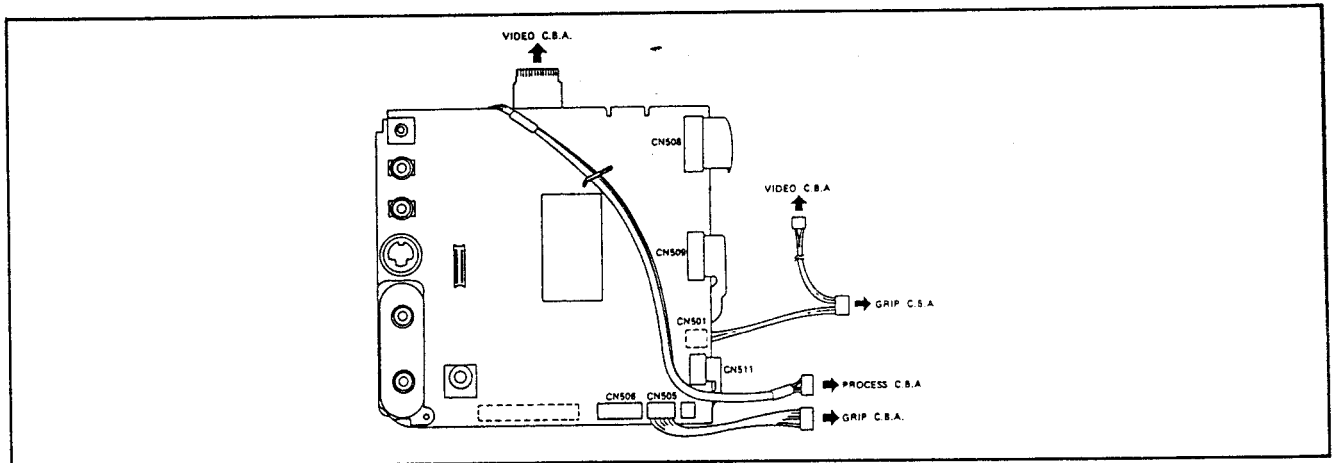


Fig. II-30

### (3) VIDEO C.B.A.

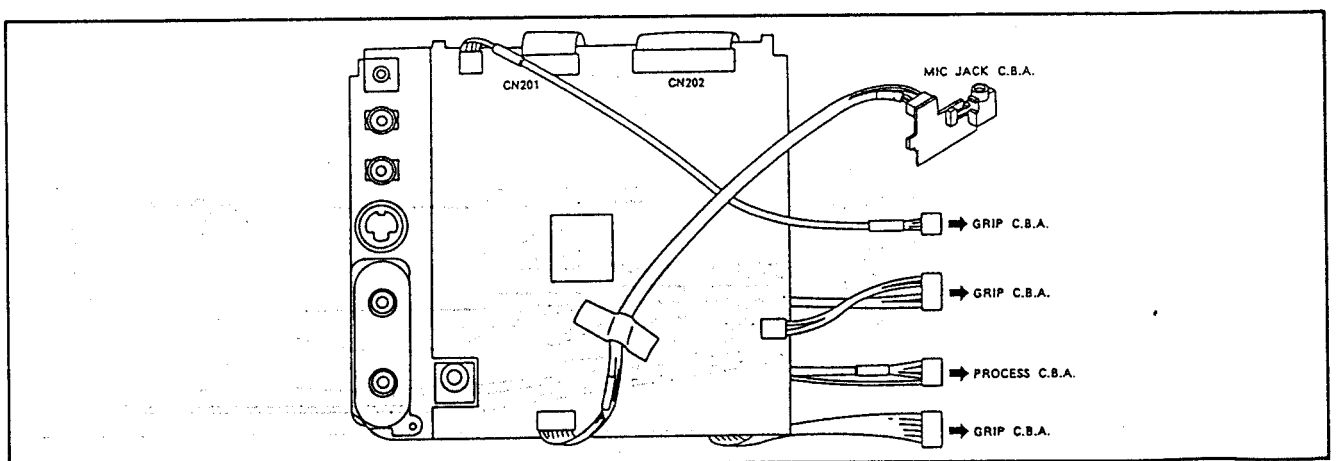


Fig. II-31

(4) Camera/Recorder Units

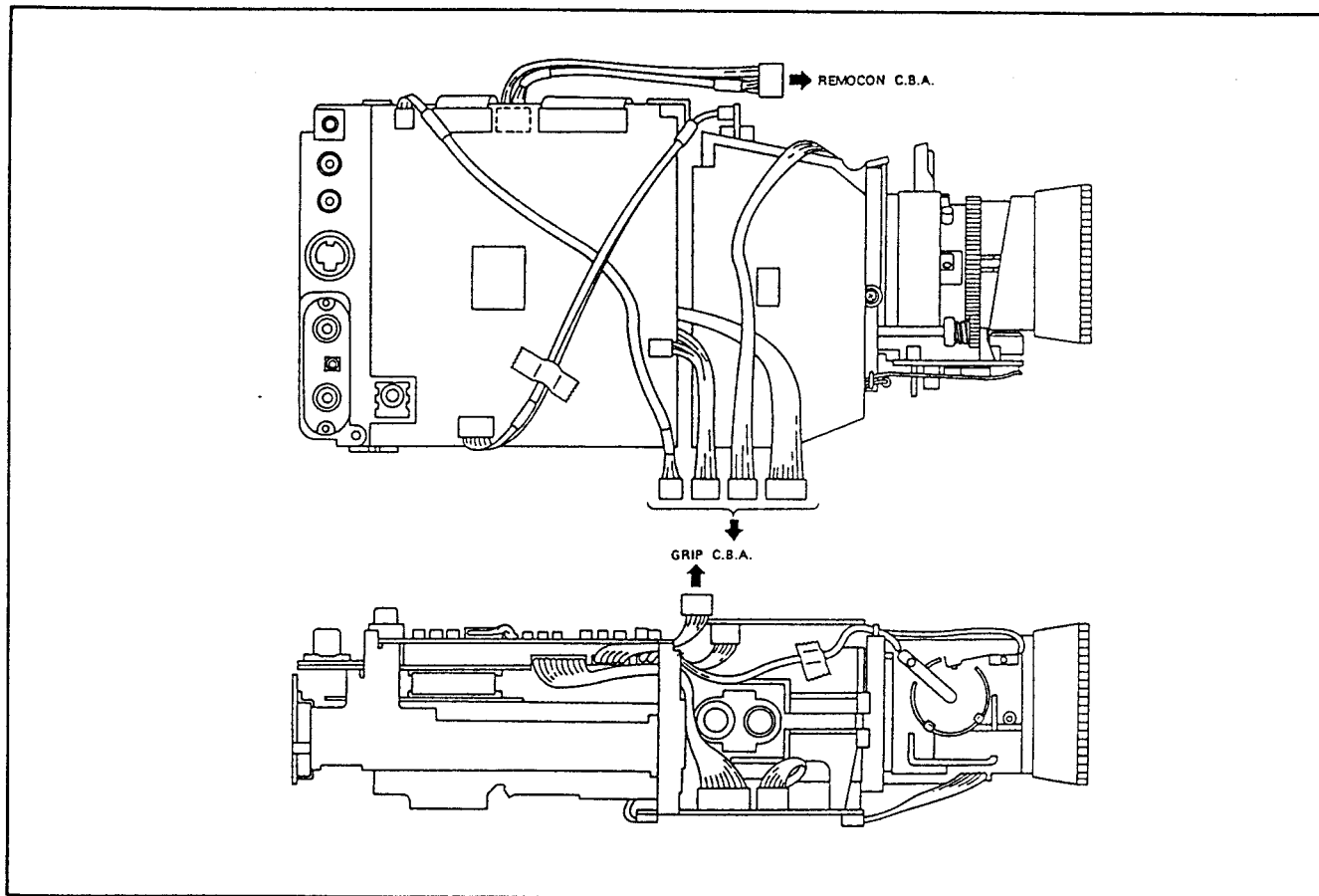


Fig. II-32

(5) GRIP C.B.A.

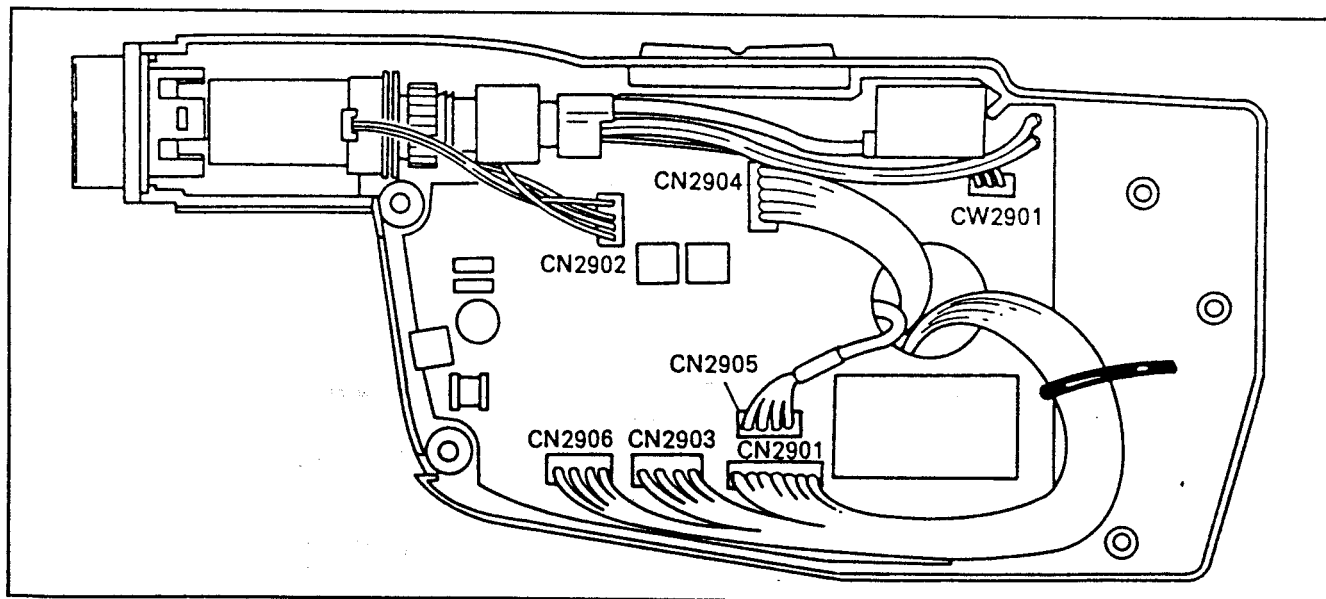


Fig. II-33



### 3. Adjustments (Lens Section)

#### 3-1 Setting

##### 3-1-1 Preparation

- (1) Collimator or equivalent  
(Refer to 3-1-2)
- (2) Infinity-distance subject

##### 3-1-2 Procedures

- (1) Remove the holder of lithium battery.
- (2) Make the same setting as in the camera adjustment.
- (3) Push the AF KEY button twice to set the MANUAL FOCUS state.

##### 3-1-3 Preparation for lens focus adjustment

\* Note: For this adjustment, pick up an actual scene at infinity (65 m or more away), or use a collimator.

Described below is the preparatory procedures by using the single-lens reflex camera and the lens (focal length: 300 mm or more recommended) in stead of a collimator.

CHART	Ground glass (30 mm x 40 mm, approx.)
TOOL	Single-lens reflex camera, lens (focal length: 200 mm or more), magnifier

- (1) Open the aperture of single-lens reflex camera fully. Then, open the rear lid.
- \* Note: If the shutter equips the valve mechanism, lock it for opening the aperture. If not (e.g. Canon T series, etc.), open the aperture by using the slow shutter and take out the internal battery immediately while the shutter is opened.
- (2) Secure the ground glass to the inside rail face by pressing it. At this step, the ground surface should face the lens side.
- (3) Shoot a scene at infinity. To check if it is in best focus, enlarge the image on the ground glass by a magnifier.

\* Note: Distance for infinity: See the Fig. II-34.

- (4) After the above checking, remove the ground glass once and mark cross hair-lines on it. Then, attach it to the camera again.

\* Remark: Using this substitute collimator, the back focus adjustment (T/W zoom correction) can be performed with high accuracy within a short time.

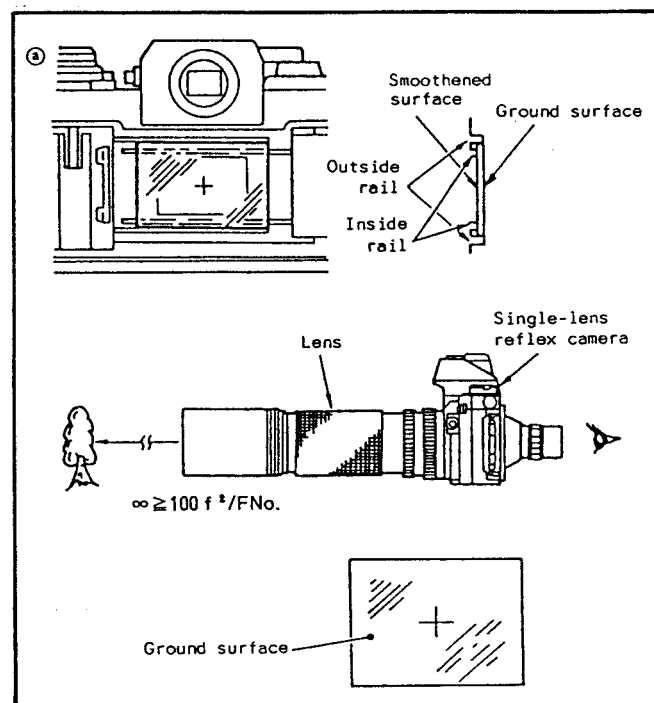


Fig. II-34

##### 3-1-4 Auto focus adjustment

\* Refer to the camera section adjustment.

### 3-2 Focus adjustments

#### 3-2-1 Back focus adjustment (T/W zoom correction)

CHART	Siemens chart located 3 m away
M. EQ.	Monitor TV
TOOL	Phillips screwdriver
ADJ.	Focusing ring, relay lens

\* Note: Open the aperture fully as possible.

- (1) Loosen the screw (a).
- (2) With the telephoto-end zoom setting, bring the pattern image into focus by turning the focusing ring.
- (3) With the wide angle end zoom setting, bring the pattern image into focus by moving the relay lens back and forth.
- (4) Repeat the above steps (2) and (3) to remove defocusing at the telephoto and wide angle ends.
- (5) Tighten the screw (a).

\* Note: When tightening, be careful not to shift the relay lens from the correct position.

- (6) Check the AF distance measuring function.

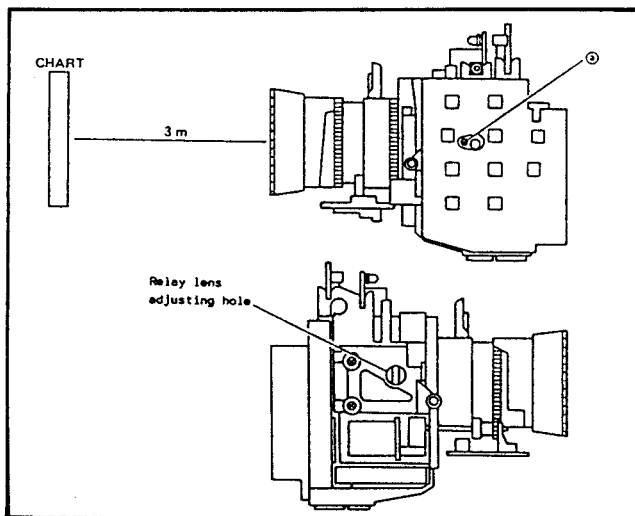


Fig. II-35

#### 3-2-2 Lens focus adjustment

\* Note: Perform this adjustment only when the focus lens assembly is replaced.

Described below is the adjustment procedures by using the single lens reflex camera instead of a collimator.

CHART	Ground glass (30 mm x 40 mm, approx.)
M. EQ.	Monitor TV
TOOL	Single-lens reflex camera, lens (focal length: 200 mm or more), phillips screwdriver
ADJ.	Focusing lens, relay lens
SPEC.	Within 1/3 of infinity mark ( $\infty$ ), (+0,5 mm)

- (1) Engage the concave helicoid with the focusing ring.
- (2) Remove the N stopper, and take out the focus lens assembly.

\* Notes: 1. When reassembling, check the screwing-in starting position.  
2. Do not exert undue force at screwing-in, or the thread may be damaged.  
3. When reassembling, apply grease as specified.

- (3) Align the axis of main unit with that of the single-lens reflex camera as accurately as possible (visual alignment).
- (4) With the telephoto end zoom setting, adjust focus using the front lens. At this time, hold the focusing ring to the infinity ( $\infty$ ) stop position, and turn the concave helicoid until the best focus is obtained.
- (5) Loosen a screw (a).
- (6) Move the relay lens back and forth with the wide angle end to bring the image into best focus.
- (7) Repeat the steps (4) and (6) until the object is into best focus both in wide and telephoto ends.
- (8) Lock the relay lens and check that the object is in best focus.
- (9) Confirm that the focusing ring is butted onto the stopper at infinity side. Then, fix the focusing ring and the concave helicoid with an instantaneous adhesives specified. (Alonalpha)

\* Notes: 1. Do not apply the adhesive excessively and also be careful not to drop it onto the other positions except indicated. (esp. AF cam part (D))  
2. Do not touch forcibly for five minutes after application.

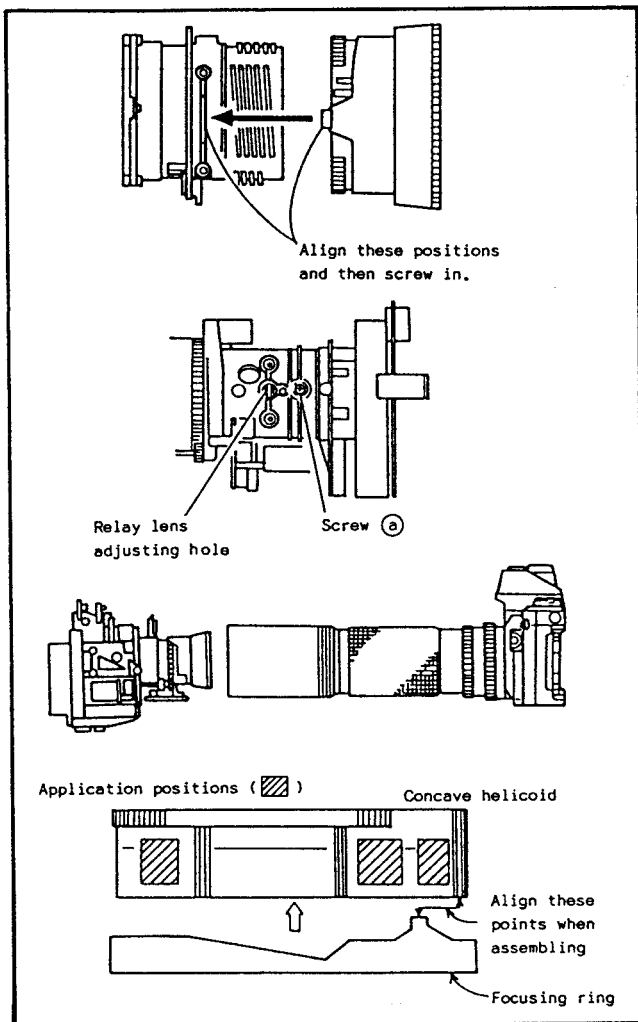


Fig. II-36

## 4. Camera Section Adjustments

### 4-1 Preparation/setting for camera section adjustments

#### 4-1-1 Setting

##### (1) Preparation

- ° Y/C Mix Amplifier II (DY9-1079-001)\* → See page II-16 (Remarks)
- ° Extension Cable Kit (DY9-1107-000)
- ° Constant Voltage Supplier (6 V)
- ° Camera Mi-Com. Adjuster (DY9-1095-000)

##### (2) Setting for camera electrical adjustments

Procedures:

- 1) Short-circuit the following test points on the AF/CAMERA KEY C.B.A.

TP2101 (GND) ↔ TP2104 (CAM. ON (L))  
TP2102 (TEST) ↔ TP2105 (SS 5V)  
CN2807 ① (GND) ↔ CN2807 ③ (CHARACTER 1)

- 2) Connect the extension cable L.
- 3) Connect the Y/C Mix Amplifier II with the extension cables H and K.
- 4) Set the switch of Y/C Mix Amplifier II to the side of "Yx1 IN".

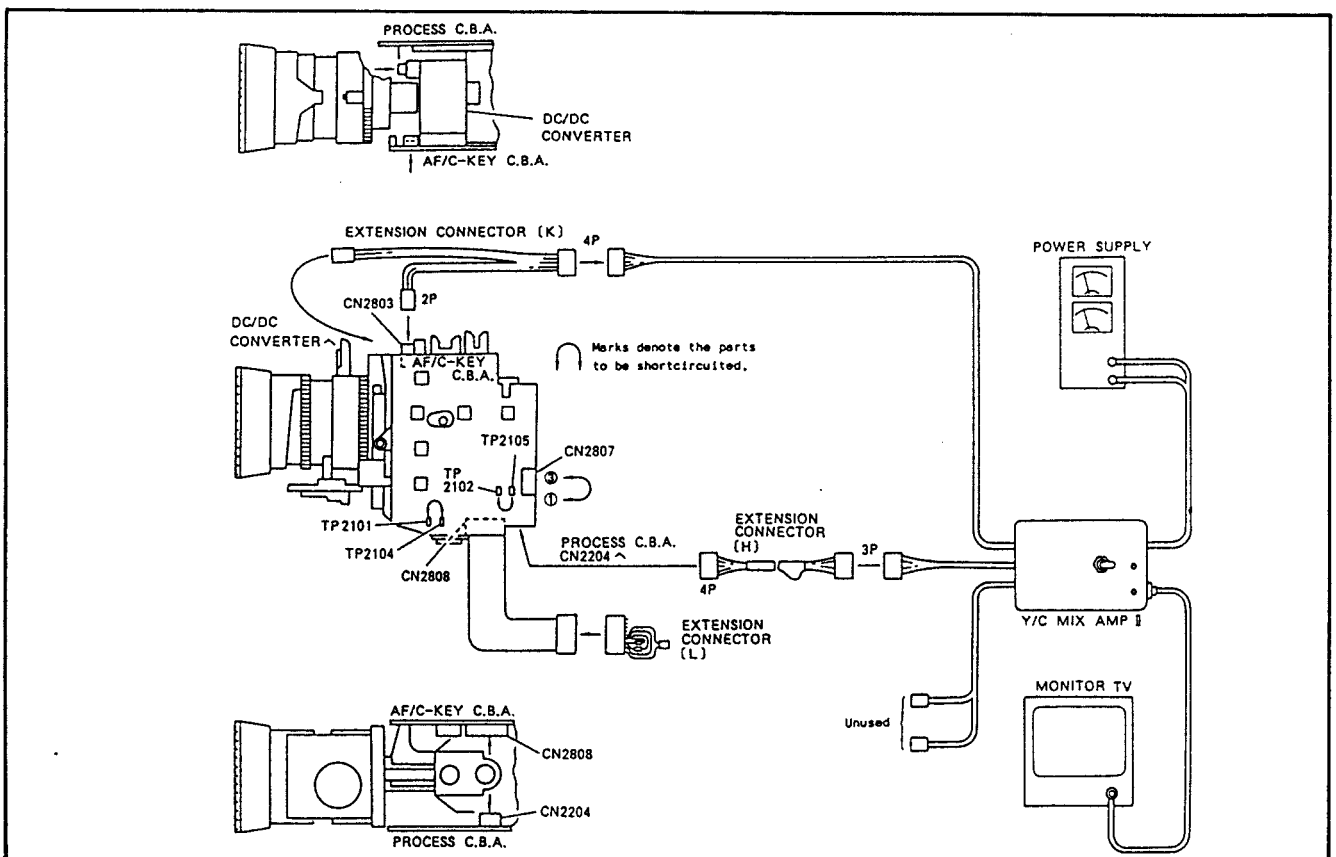


Fig. II-37

(3) Setting for camera microcomputer adjustment

Connect the Camera Mi-com. Adjuster as follows.

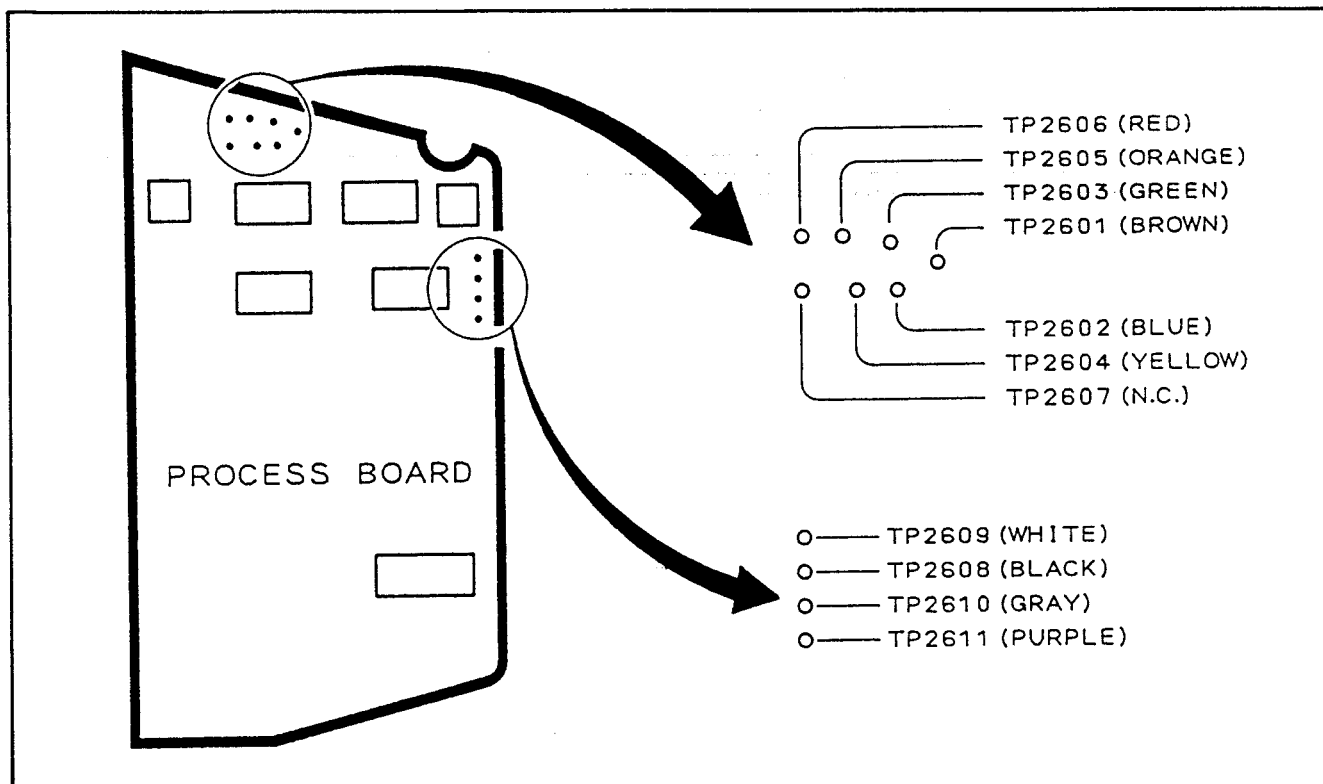


Fig. II-38

\* Remarks

• Modification procedure of Y/C Mix Amp. (DY9-1079-000)

Y/C mix amplifier (DY9-1079-000) can be used for the E800Hi after the following modification.

(\* Without the modification, the picture on the monitor TV appears dark because the amplitude voltage (p-p) of luminance signal (E800Hi) is half of other conventional models'.)

1. Procedures:

- (1) Prepare the Y/C mix amplifier modification parts kit. (DY9-1104-000)
- (2) To take out a bottom plate, remove four screws securing the C.B.A. inside. ,
- (3) Connect lead wires (5 cm, approx.) between two terminals of SW1. (Any lead wire is available.)
- (4) Connect one lead wire of SW1 and the middle point of VR3.
- (5) Connect SW1 and VR3 to both ends of R6.
- (6) Make a hole on the external cover package, then fix the SW1 there.  
\* Note: Fold the wire of SW1 not to contact the other parts.
- (7) Apply "Yx1 IN" seal to ON side, "Yx2 IN" to OFF side.  
\* Note: Yx1 IN → A1 MARK II, Yx2 IN → conventional models

## 2. Calibration:

- (1) Connect the Y/C mix amplifier II to the E800Hi. (See Fig. II-37)
- (2) Turn the Power Switch on, and set the SW1 to ON (Yx1 IN) side.
- (3) Adjust VR3 so that the SYNC levels of luminance signal (pin 1, CN4) and VIDEO OUT signal at TP1 become the same.

\* Note: At this time, the video output terminal of Y/C mix amplifier is connected to a monitor TV.

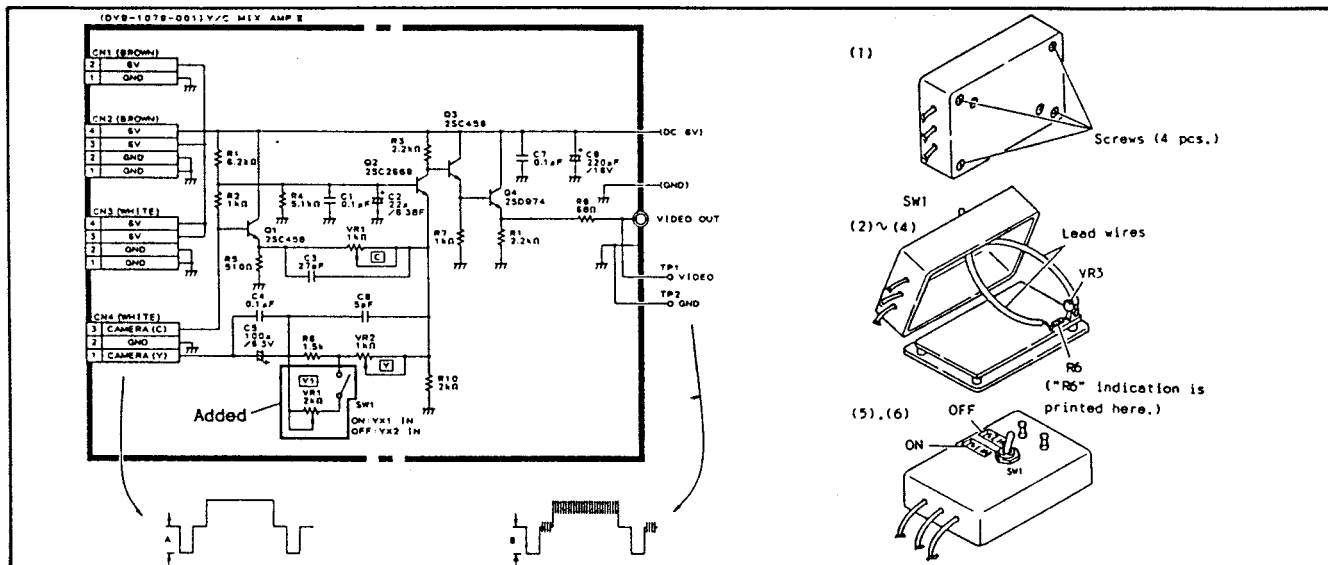


Fig. II-39

#### 4-1-2 How to open C.B.A.s

Procedures:

- (1) Detach the PROCESS and AF/CAMERA KEY C.B.A.s.
- (2) Connect each C.B.A.s with the extension cables A, B, C and D.

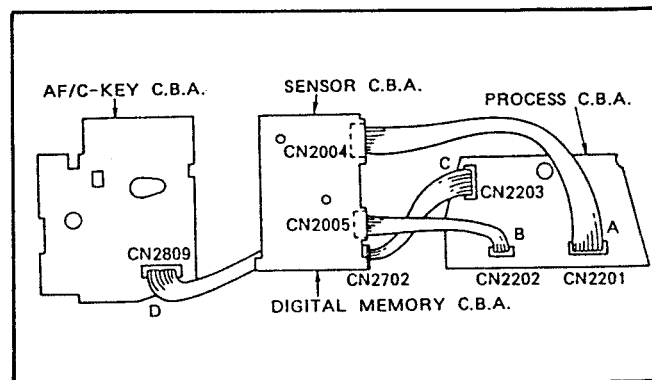


Fig. II-40

#### 4-1-3 Charts

- (1) Fixture (attached to Service Manual for A1)

Use the Fixture for the blooming adjustment .

Set the fixture onto the front face of lens, and attach the ND 2.0 filter.

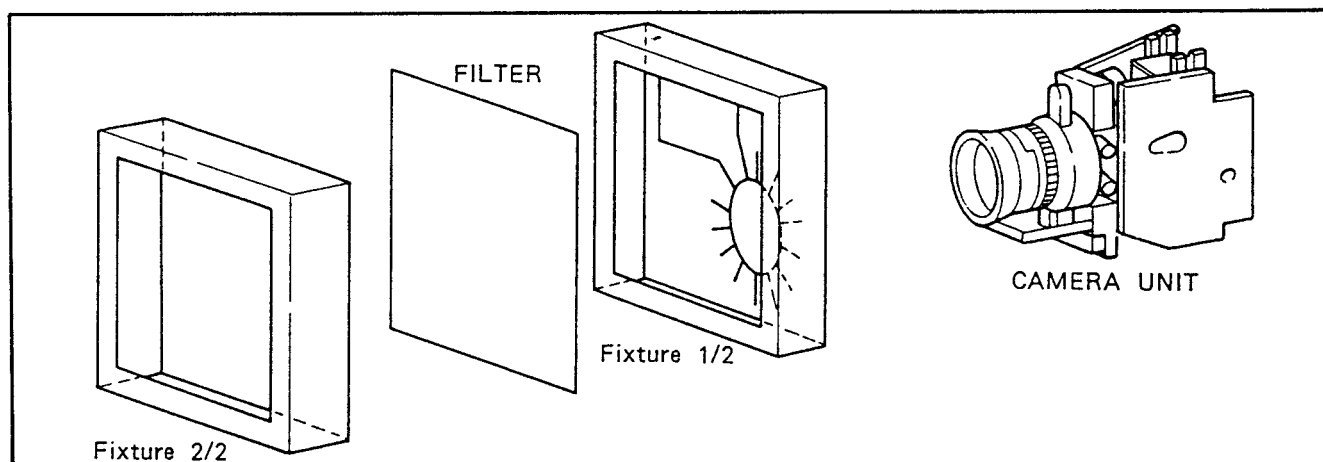


Fig. II-41

- (2) U-chart

Make a U-chart by cutting a "U" pattern off from the center of black paper.

Size is detailed in the Fig. II-42. (X marks indicate the standard picture frame).

\* Note: For the blooming adjustment, attach a piece of white paper onto the rear side.

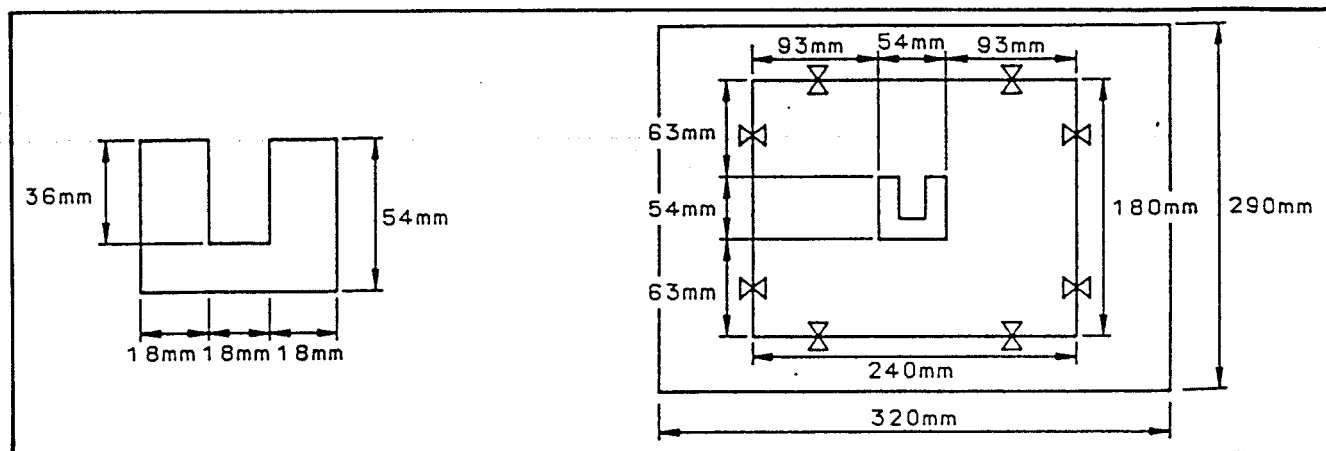


Fig. II-42

#### 4-1-4 Other notices

- (1) Prior to each adjustment, energize the equipment for 3 minutes or longer.
- (2) Set the light box at color temperature 5600°K.
- (3) "Standard angle of view"
  - ° The "standard angle of view" is given when the charts displayed so as to meet the maximum screen of the full scan monitor.
  - ° With an oscilloscope, adjust the grayscale (36  $\mu$ s) and the color bar (52  $\mu$ s) followed by shooting.
  - ° Shoot the white chart at its center.
  - ° Unless otherwise specified, shooting distance must be 1.4 m.

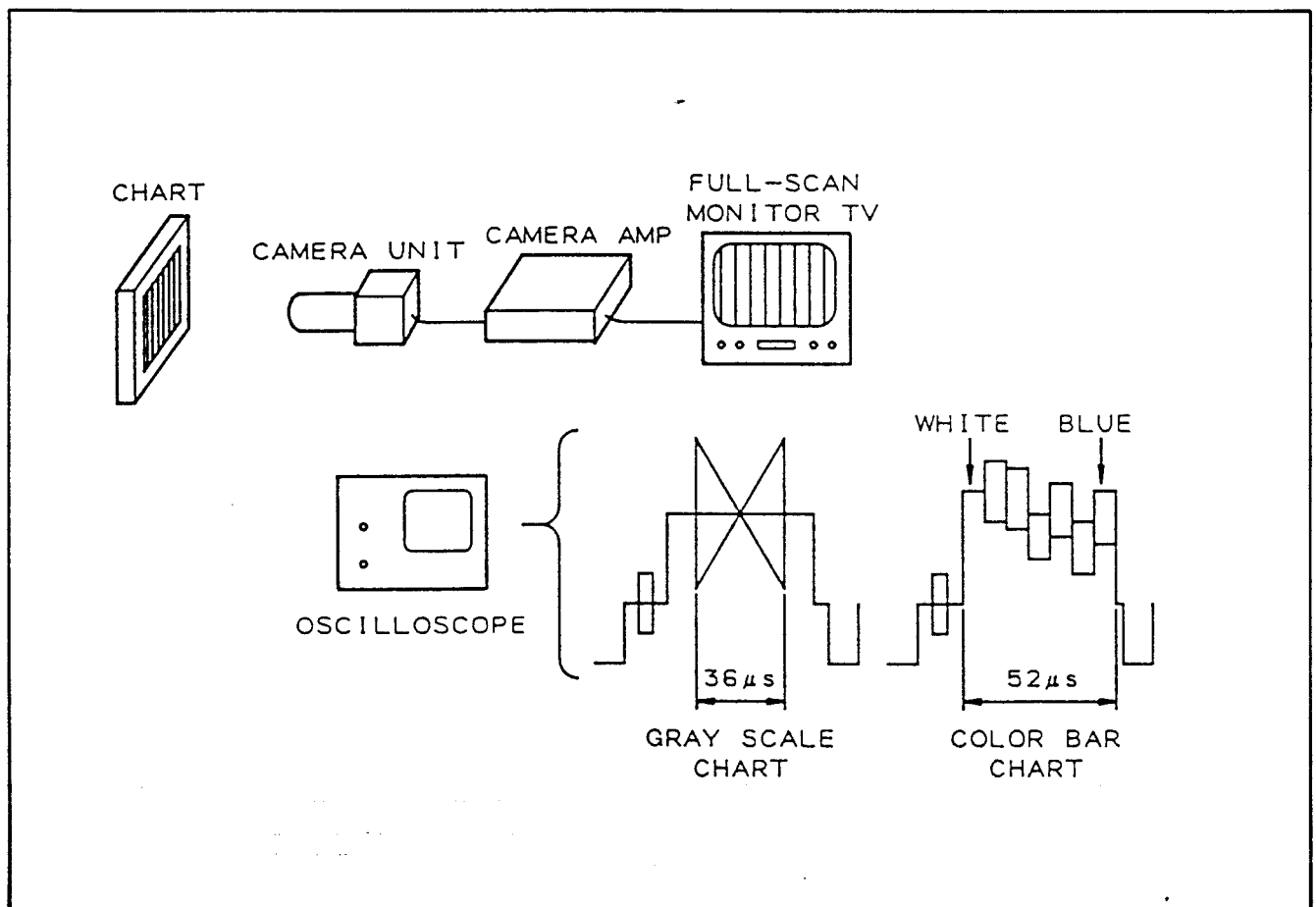


Fig. II-43



## 4-2 Electrical adjustments (camera section)

\* Note: For the adjustments from 4-2-1 through 4-2-12, set the ADJUSTMENT mode.  
To set it, connect TP2601 (ADJ. MODE) and TP2207 (+5 V).

### 4-2-1 Clock adjustment

MODE	AF
M. EQ.	Oscilloscope
TP/TRIG.	AF/C-KEY C.B.A. TP2809 (AF FRAME)/ TP2810 (HD)
ADJ.	AF/C-KEY C.B.A. VC2801 (CLOCK)
SPEC.	$35.7 \pm 0.5 \mu s$

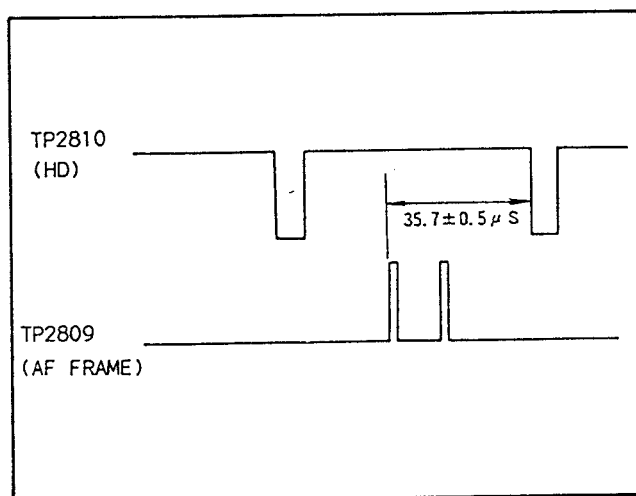


Fig. II-44

### 4-2-2 ES offset adjustment

CHART	Lens-capped
MODE	AF, AE LOCK
M. EQ.	Digital voltmeter
TP/TRIG.	AF/C-KEY C.B.A. TP2802 (1.8 V)/ TP2803 (OFFSET)
ADJ.	AF/C-KEY C.B.A. VR2801 (ES OFFSET)
SPEC.	$0 \pm 10 mV$

#### Procedures:

- (1) Shortcircuit (A) (FL2801 side of C2803) and ground.
- (2) Adjust the potential difference between both TPs. (Either of polarities is accepted.)

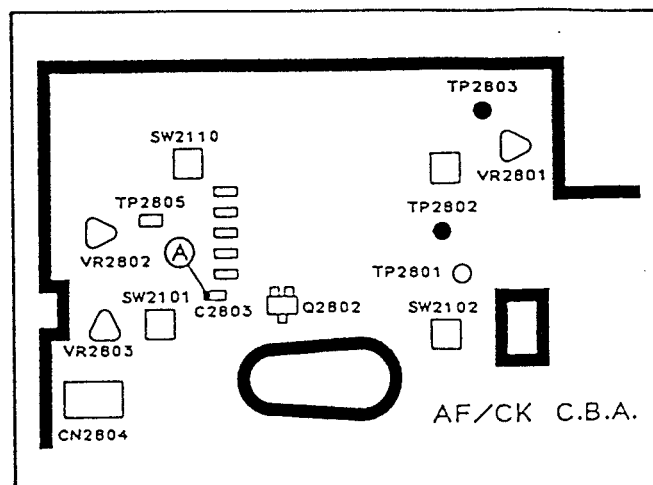


Fig. II-45

### 4-2-3 IRIS encoder adjustment

M. EQ.	Digital voltmeter
TP/TRIG.	AF/C-KEY C.B.A. TP2805 (IRIS POSITION)

#### CLOSE voltage

MODE	IRIS CLOSE PRO. C.B.A. TP2201 (IRIS O/C) $\leftrightarrow$ GND
ADJ.	AF/C-KEY C.B.A. VR2802 (IE OFFSET)
SPEC.	$0.80 \pm 0.02 V$

#### OPEN voltage

MODE	IRIS OPEN PRO. C.B.A. TP2201 (IRIS O/C) $\leftrightarrow$ TP2207 (+5V)
ADJ.	AF/C-KEY C.B.A. VR2803 (GAIN)
SPEC.	$2.80 \pm 0.02 V$

\* Note: Both specifications of voltage, "CLOSE" and "OPEN" should be obtained at the same time.

#### 4-2-4 Clock frequency adjustment

M. EQ.	Frequency counter (connect via an oscilloscope)
TP/TRIG.	PRO. C.B.A. TP2209 (SP2)
ADJ.	SENS. C.B.A. VC2001 (CLOCK)
SPEC.	6.437500 MHz $\pm$ 15 Hz

#### 4-2-5 PLL adjustment

M. EQ.	Digital voltmeter
TP/TRIG.	PRO. C.B.A. TP2206 (PLL)
ADJ.	SENS. C.B.A. VC2002 (PLL)
SPEC.	2.5 $\pm$ 0.2 V

#### 4-2-6 Auto iris adjustment

\* Note: After the adjustment, operate the iris with lens-capped and uncapped repeatedly to check if the specified value is obtained.

CHART	Grayscale (5600°K)
MODE	ADJ. MODE
M. EQ.	Oscilloscope
TP/TRIG.	PRO. C.B.A. TP2202 (S/H OUT) TP2204 (FH/2)
ADJ.	PRO. C.B.A. VR2201 (IRIS)
SPEC.	300 $\pm$ 10 mV

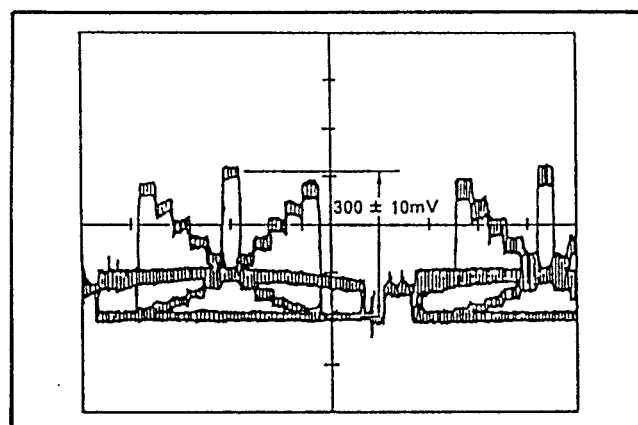


Fig. II-46

10  $\mu\text{s}$ /5 mV

#### 4-2-7 OB set adjustment

CHART	Lens capped
MODE	ADJ. MODE
M. EQ.	Oscilloscope
TP/TRIG.	PRO. C.B.A. TP2205 (Y0H) TP2204 (FH/2)
ADJ.	PRO. C.B.A. VR2202 (OB SET)
SPEC.	Levels of waveform and blanking centers to be the same ( $0 \pm 10$ mV)

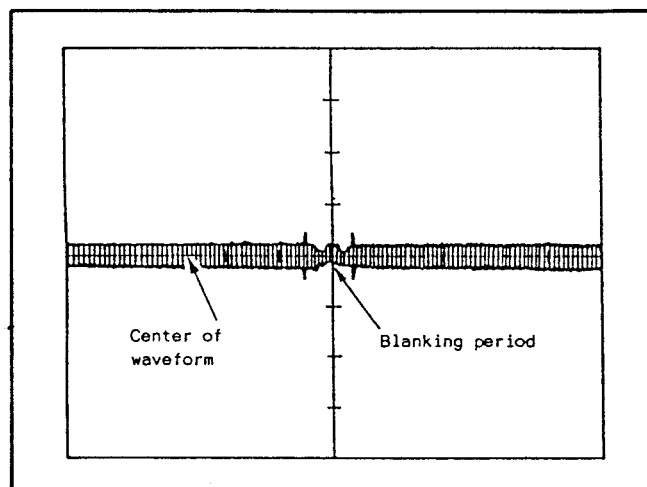


Fig. II-47

10  $\mu\text{s}$ /5 mV

#### 4-2-8 Y level adjustment

\* Notes: Before the adjustment, release the white clip.  
TP2403 (WHT CLIP)  $\leftrightarrow$  TP2207 (+5V)

CHART	Grayscale (5600°K)
MODE	ADJ. MODE
M. EQ.	Oscilloscope
TP/TRIG.	PRO. C.B.A. TP2402 (Y OUT) TP2204 (FH/2)
ADJ.	PRO. C.B.A. VR2203 (AGC LEVEL)
SPEC.	1000 $\pm$ 20 mV

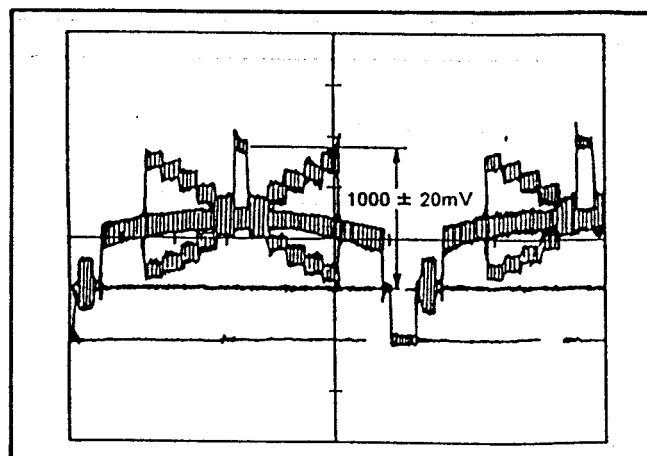


Fig. II-48

10  $\mu\text{s}$ /50 mV

#### 4-2-9 1/2 fH color difference adjustment

CHART	Lens-capped
MODE	ADJ. MODE
M. EQ.	Oscilloscope
TP/TRIG.	TP2210 (COH), TP2204 (FH/2)
ADJ.	VR2204 (FH/2)
SPEC.	$0 \pm 10$ mV

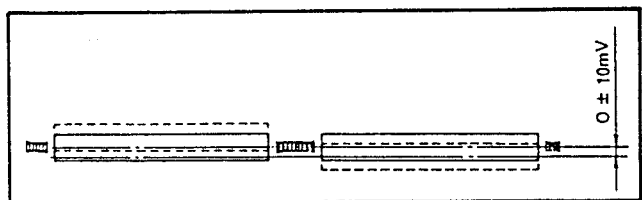


Fig. II-49

#### 4-2-10 Color difference gain/modulation axis adjustment

CHART	Color bar (5600°K)
MODE	ADJ. MODE
M. EQ.	Vectorscope
ADJ.	PRO. C.B.A. VR2205 (C1H LEVEL) PRO. C.B.A. VR2403 (BURST $\phi$ ) PRO. C.B.A. VC2401 (SC 90)
SPEC.	° Overlay each bright dot Acceptable dot split: Phase $5^\circ$ or less Gain 10% or less ° Burst phase: $135 \pm 2^\circ$

\* Note: Measure dot split according to Fig. II-50.

##### Procedures:

- (1) Align each bright dot same. (VR2205, 2403).
- (2) Make the length of burst level in every 1H same. (VC2401)

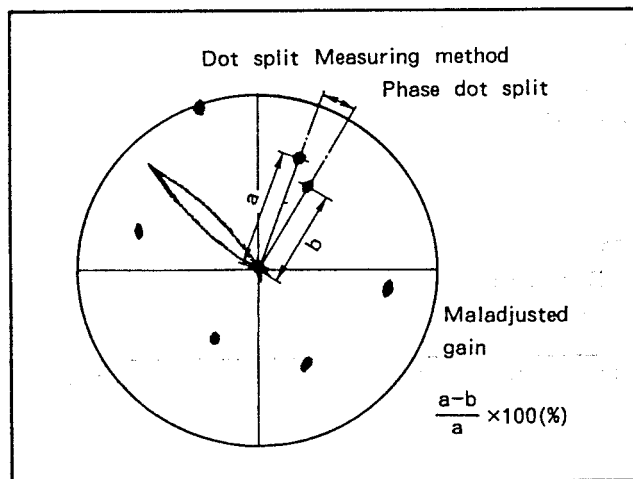


Fig. II-50

#### 4-2-11 Carrier balance adjustment

CHART	Glayscale (See Fig. II-51)(5600°K)
MODE	ADJ. MODE
M. EQ.	Vectorscope
ADJ.	VR2402 (B-Y CB), VR2401 (R-Y CB)
SPEC.	Bring dot (dark part) to be centered

- \* Notes:
1. Turn a zoom setting from the standard angle of view to a wide angle for the adjustment.
  2. If two dots are appeared, choose a dot in the dark part.

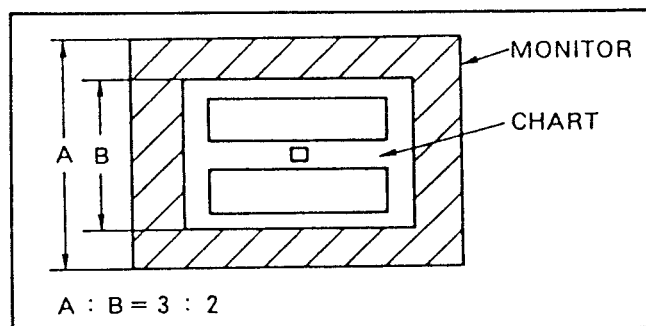


Fig. II-51

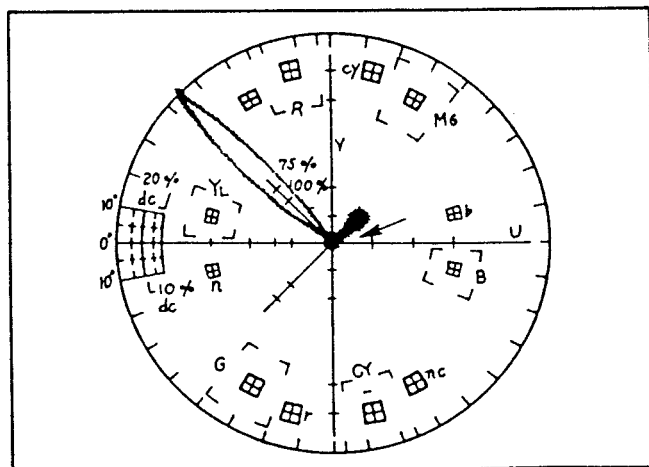


Fig. II-52

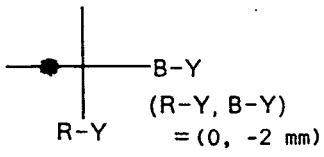
#### 4-2-12 Camera microcomputer adjustment

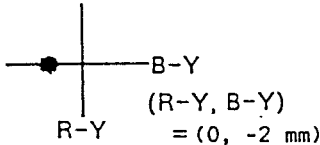
- \* Notes: 1. When carrying out a single step among the steps 1 through 5 independently, be sure to perform the step 6 after it.  
2. When "8" flashes on the LED, check the wiring, etc.

STEP NO.	CHART	M. EQ.	SPECIFICATION												
1	Lens capped	Vectorscope	None (Bright dot centering unnecessary).												
2	Grayscale	Vectorscope	Bright dot (white) is at the position of "0, -2 mm".												
3	Color bar (5600°K)	Vectorscope	<table><tr><td></td><td>PHASE</td><td>GAIN</td></tr><tr><td>R</td><td>106° ± 1°</td><td>1.5 ± 0.1</td></tr><tr><td>Ye</td><td>164° ± 2°</td><td>1.1 ± 0.1</td></tr><tr><td>G</td><td>245° ± 6°</td><td>-</td></tr></table>		PHASE	GAIN	R	106° ± 1°	1.5 ± 0.1	Ye	164° ± 2°	1.1 ± 0.1	G	245° ± 6°	-
	PHASE	GAIN													
R	106° ± 1°	1.5 ± 0.1													
Ye	164° ± 2°	1.1 ± 0.1													
G	245° ± 6°	-													
4	White (5600°K + CCA12) filters (2 pcs.), grayscale	Oscilloscope	Refer to the each procedure below.												
5	White (5600°K + CCA12)	Vectorscope	Bright dot (white) is at the position of "0, -2 mm".												

#### Procedures:

- Referring to the Fig. II-39, connect the Camera Mi-Com. Adjuster (DY9-1095-000) to the PROCESS C.B.A.
- Perform the steps from 1 through 6.
- Remove the camera adjuster.

STEP NO.	ADJUSTMENT	PROCEDURE	CHECK ITEMS ON LED
0		0-0 ADJ. SW "L" state: Camera operates normally. (Used for the operation checks)	"0" blinks
1	YH, Y IRIS black level set	1-0 Set the ADJ. SW to "H".	"1" blinks
		1-1 1. Cap the lens. 2. Push the DATA SW.	"1" flashes (for 1 sec.) → lights up
2	Carrier and white balances	2-0 Push the MODE SW.	"2" blinks
		2-1 1. Shoot the grayscale (5600°K) with a standard angle of view. 2. Push the DATA SW.	"2" flashes (for 1 sec.) → lights up
		2-2 1. Set the EVR SW to "H" or "L". 2. Push the DATA SW to set the bright dot to (0, -2 mm). * Burst must be on the circumference.	"2" flashes (for 1 sec.) → lights up
			
		2-3 1. Check that the bright dot (black) is centered, and the bright dot (white) is at the position of "0, -2 mm". 2. Push the DATA SW.	"2" flashes (for 1 sec.) → lights up

STEP NO.	ADJUSTMENT	PROCEDURE		CHECK ITEMS ON LED
3	Color balance (5600°K)	3-0	Push the MODE SW.	"3" blinks
		3-1	1. Shoot the color bar chart (5600°K) with a standard angle of view. 2. Push the DATA SW.	"3" lights up
		3-2	1. Set the EVR SW. to "H" or "L". 2. Push the UP/DOWN SW. to adjust the color balance.	"3" lights up
4	Skin color	4-0	Push the MODE SW.	"4" blinks
		4-1	1. Shoot the grayscale with a standard angle of view. 2. Shot the white chart (5600°K) with telephoto angle. 3. Attach the CCA12 filter. 4. Push the DATA SW. 5. Remove the filters.	"4" flashes (for 1 sec.) → lights up
5	White balance (5600°K + CCA12)	5-0	Push the MODE SW.	"5" blinks
		5-1	1. Shoot the white chart (5600°K + CCA12). 2. Push the DATA SW to set the bright dot to (0, -2 mm). * Burst must be on the circumference.  	"5" flashes (for 1 sec.) → lights up
6	E <sup>2</sup> PROM writing	6-0	Push the MODE SW.	"6" blinks
		6-1	Push the DATA SW.	"6" lights up

#### 4-2-13 Blooming adjustment

- \* Notes:
1. Perform this adjustment only when the CCD is replaced. Before the PROCESS C.B.A. is replaced, measure the voltage at pin 20 of CCD (V SUB) in advance. After mounting the new C.B.A., adjust the VR2101 to make the pin voltage same as that measured in advance.
  2. If 300 mV cannot be obtained in the step (6), reduce the thickness of white paper to be attached on the rear side of U-pattern chart.

CHART	U-pattern chart (with white paper)
MODE	Iris opened TP2201 (IRIS O/C) ↔ TP2207 (5 V)
M. EQ.	Oscilloscope
TOOL	ND-2.0 filter (DY9-2044-000) Halogen lamp, White paper (thin one),
TP/TRIG.	PRO. C.B.A. TP2202 (S/H OUT) TP2204 (FH/2)
ADJ.	SENS. C.B.A. VR2101 4V SUB)
SPEC.	TYPE I Suppress blooming TYPE II 1100 mV

##### Procedures:

- (1) Open the iris. (TP2201 ↔ TP2207)
- (2) Attach the ND-2.0 filter on the front face of lens with the fixture.
- (3) Prepare a U-pattern chart with a white paper attached on its rear side.
- (4) Make setting as shown in the Fig. II-54.
- (5) Shoot the U-pattern chart with the standard angle of view.
- (6) Locate the halogen lamp so that the signal level at TP2202 becomes 300 mV ("A" in the figure). Also, adjust the angle of halogen light so that the waveform in the Fig. II-54 is obtained.
- (7) Remove the ND-2.0 filter and observe the monitor TV. (Fig. II-55)
- (8) Adjust VR2101 to check if the blooming is appeared.

TYPE I: If the blooming is appeared, adjust to a point where the blooming is begun to be suppressed.

TYPE II: If the blooming is not appeared, adjust the signal level at TP2201 to 1100 mV (by VR2101).

TYPE II: If the blooming is not appeared, adjust the signal level at TP2201 to 1100 mV ("A" in the figure) by VR2101.

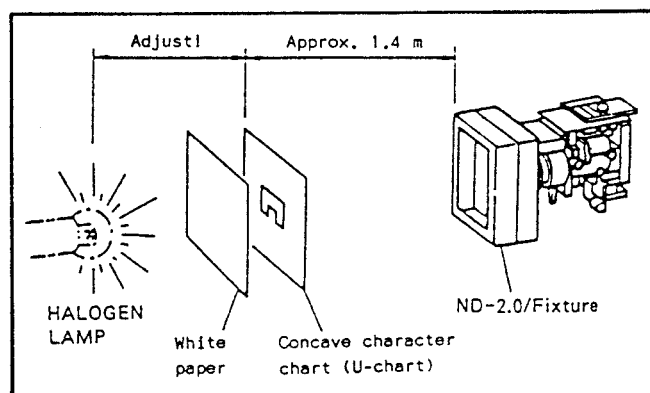


Fig. II-53

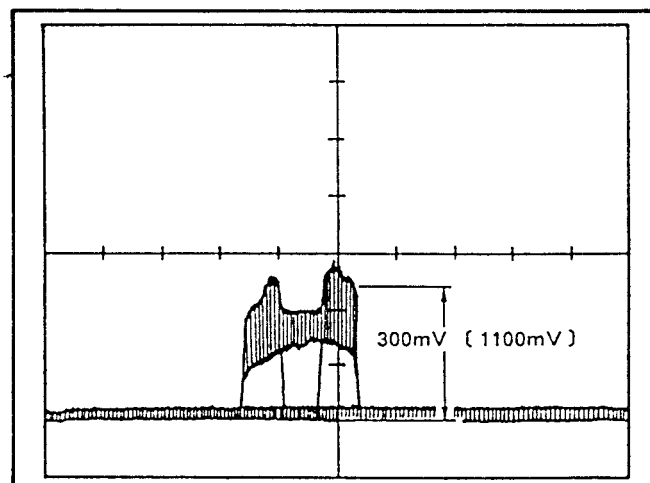


Fig. II-54

10 μs/10 mV

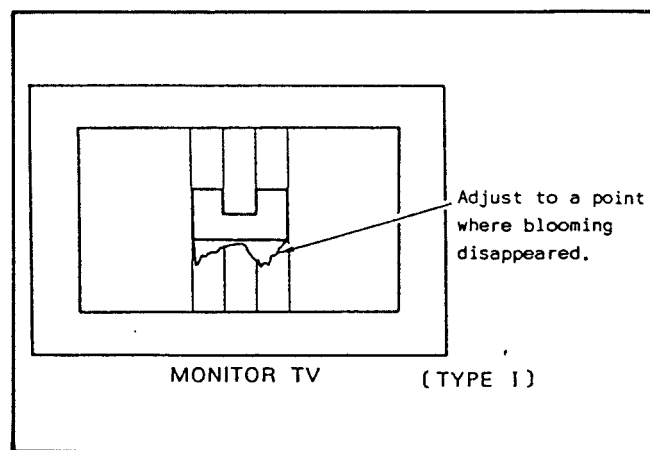
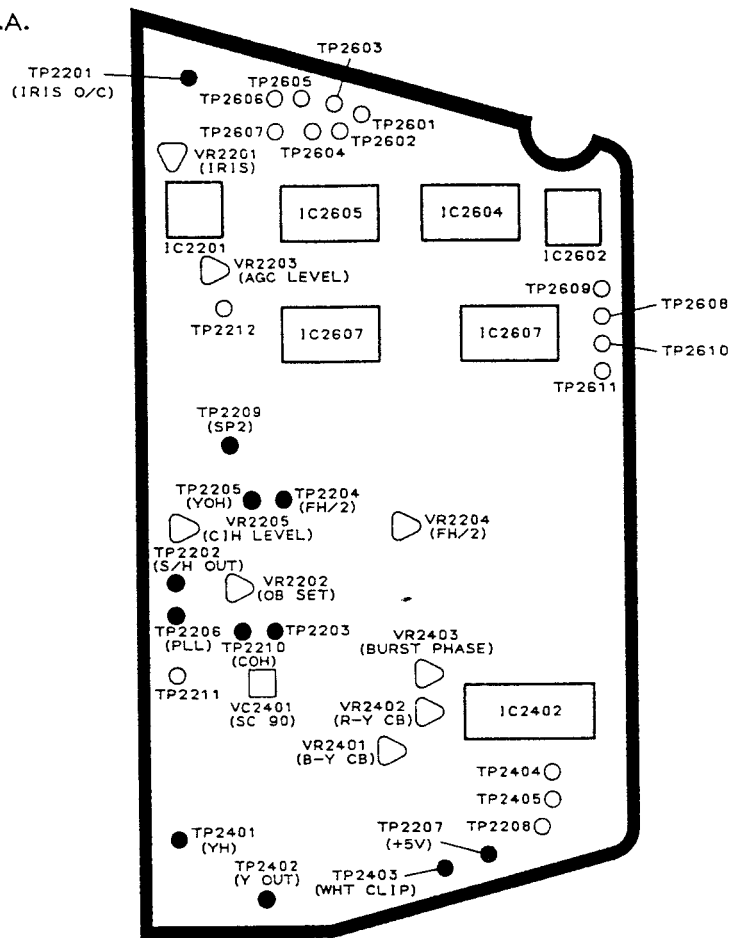


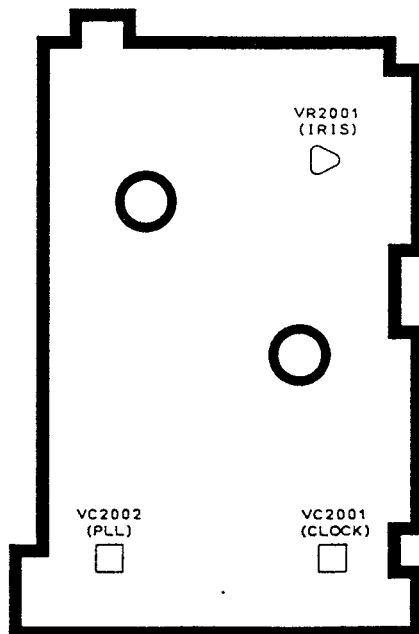
Fig. II-55

# Locations of TP/VR/VC

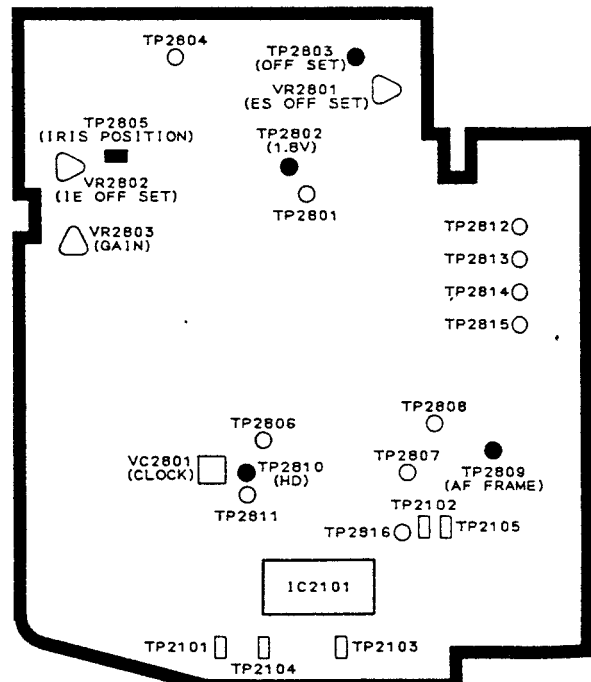
## PROCESS C.B.A.



## SENSOR C.B.A.



## AF/C-KEY C.B.A.



## 5. Recorder, EVF Section Adjustments

### 5-1 Preparation/setting for recorder section adjustments

#### 5-1-1 Setting

##### (1) Preparation

- ° Y/C Separator (DY9-1093-500)
- ° Extension Cable Kit (DY9-1107-000) I,J,M,N,O,P,Q
- ° Constant Voltage Supplier (15 V) or Camera Adapter
- ° Constant Voltage Supplier (6 V)

##### (2) Setting I for recorder adjustments (for displaying characters)

Procedure: Connect each prepared devices as in the Fig. II-56.

- \* Notes: 1. In case that the character display (monitor TV) is not necessary, refer to the next setting II.
2. To check the audio system, connect the microphone.

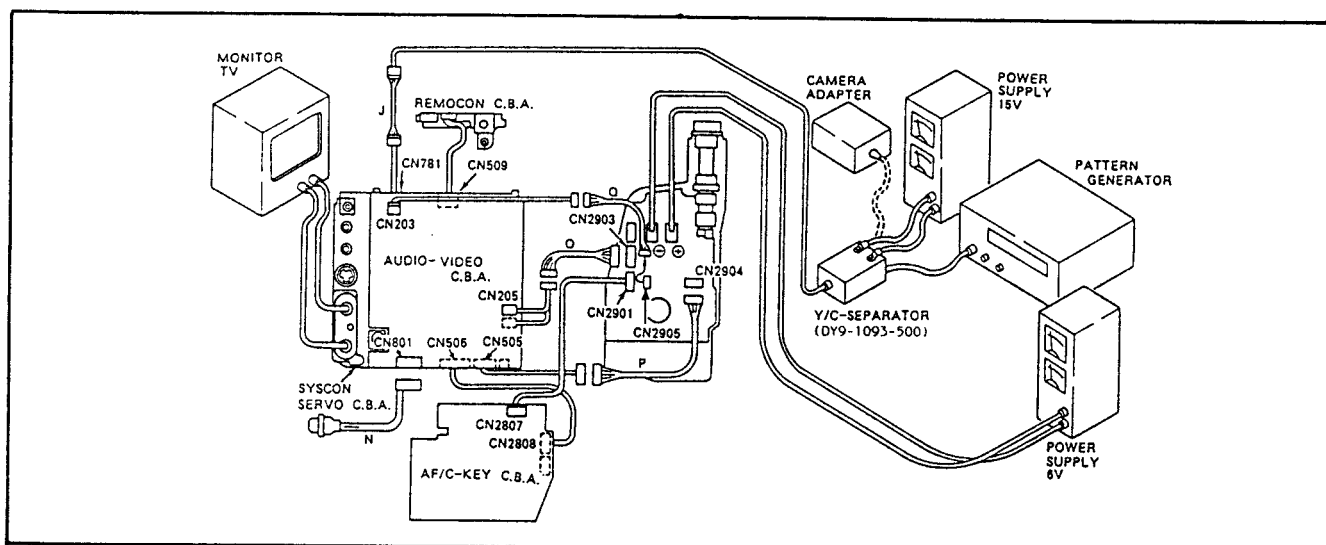


Fig. II-56

##### (3) Setting II for recorder adjustments

Procedure: Connect each prepared devices as in the Fig. II-56.

- \* Notes: 1. This setting does not require the GRIP and AF/CAMERA KEY C.B.A.s.
2. As the character generator is connected with the GRIP C.B.A., character is not displayed by this setting.
3. To release the battery voltage dropout detecting function, supply a voltage to pin 4 of CN505 (SS C.B.A.) with the extension cable M.

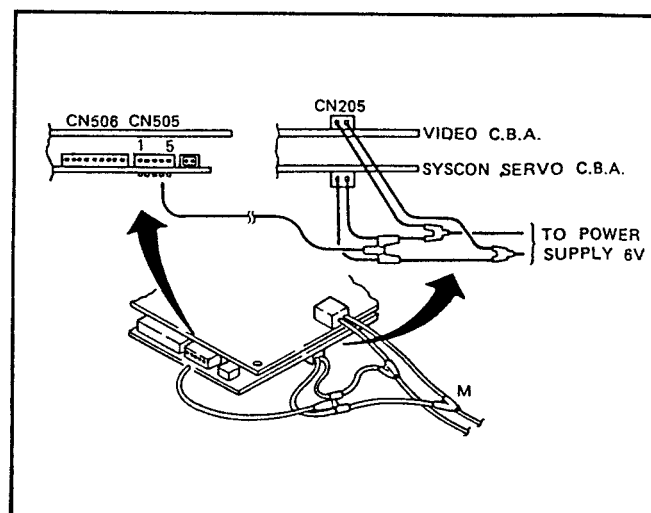


Fig. II-57



(4) Setting for the tape transport adjustment

Procedure: Perform the setting I, and make adjustment using the extension cable I.

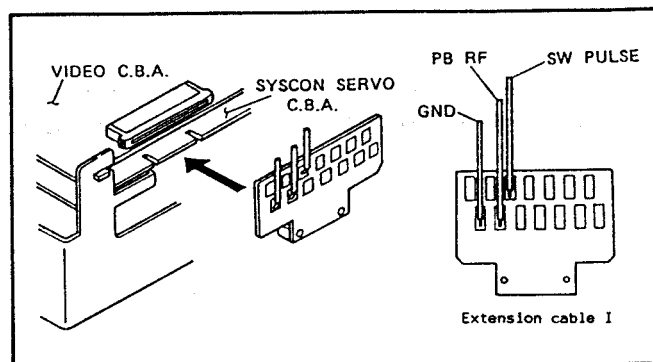


Fig. II-58

5-1-2 How to open C.B.A.s

• VIDEO C.B.A.

Procedures:

- (1) Remove two screws to open the C.B.A.
- (2) Connect with the SYSCON SERVO C.B.A. using the extension cable.

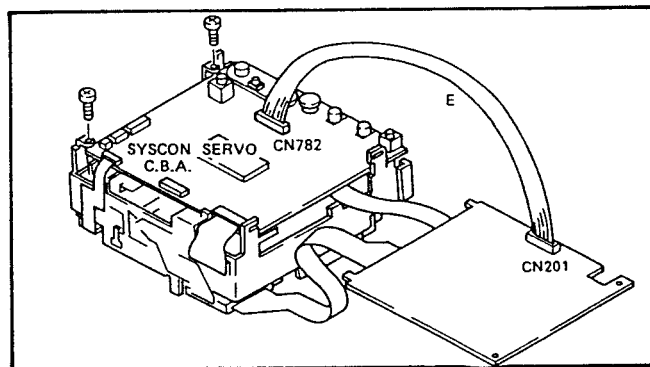


Fig. II-59

• SYSCON SERVO C.B.A.

Procedures:

- (1) To disconnect the CN502 and 509.
- (2) To unplug the flexible connector of CN023 of drum assembly, open the C.B.A.
- (3) Connect between the drum assembly and CN509, CN023 and CN502 using the extension cables F and G.

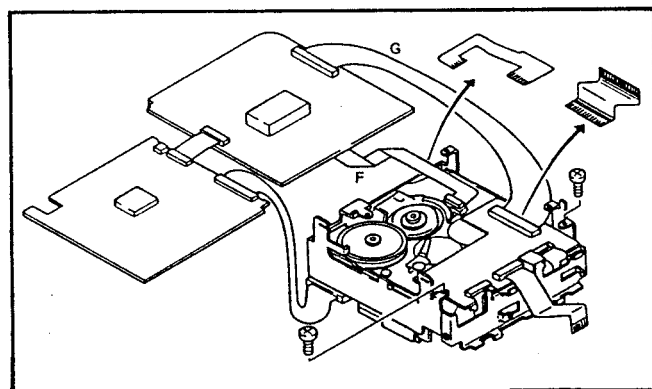


Fig. II-60

• CJ C.B.A.

Procedures:

- (1) Remove a screw.
- (2) Unplug the flexible connector of CN022.
- (3) Open the C.B.A.
- (4) Connect the flexible connector of CN022 again.

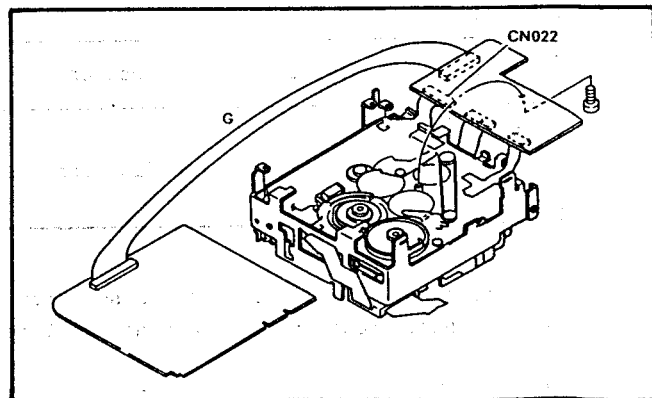


Fig. II-61

### 5-1-3 Service modes

The service modes are provided for operation check. Activate each mode with the recorder and the GRIP, AF/CAMERA-KEY C.B.A. connected for the purpose of character display.

#### (1) Transition to service modes

Mode is switched over when the pattern of wireless remote controller is short-circuited.

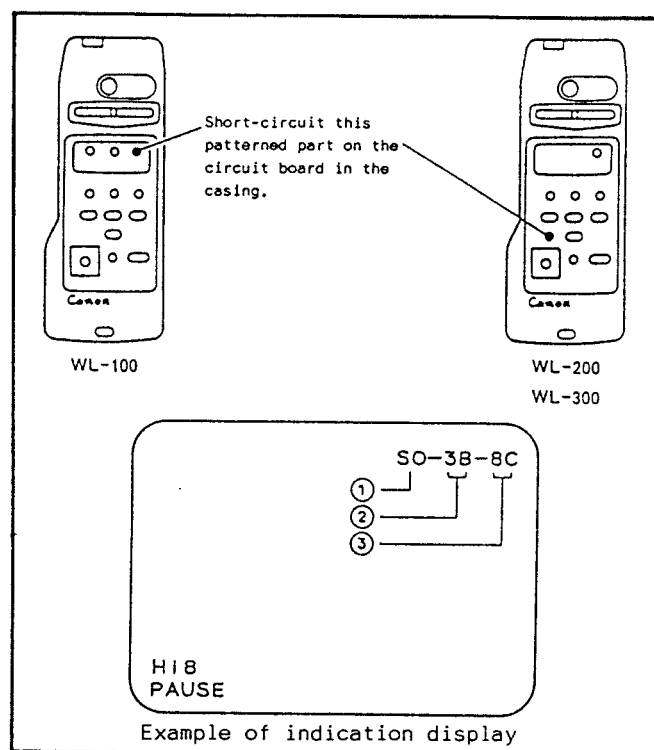
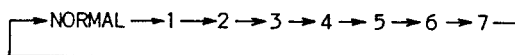


Fig. II-62

#### (2) Function of service mode

The following table shows the function of each service mode. The trouble stop function is cancelled at each mode.

STEP	FUNCTION
1	Unused for servicing. (220 degrees, 100% on-track, Power LED flashes at 0.5 sec.)
2	Used for the tape transport adjustment. (220 degrees, 70% on-track, Power LED flashes at 1 sec.)
3	Cancel the trouble stop function
4	Set the LINE IN (in REC mode only)
5	Cancel the trouble stop function
6	
7	

In recording, the LINE IN mode is set from the step 4. The original mode (CAMERA IN) can be set by shortcircuiting the terminal 16 times.

In LINE IN mode, no picture appears on the monitor TV. (Picture can be seen on the EVF screen.)

### (3) Service mode indication

The steps of each mode (SERVICE) are not displayed. By counting the number of short circuiting the pattern of remote controller, judge it.

#### 1) Error indication (hexadecimal rotation)

- ° Reel error : 2
- ° Drum error : 4
- ° Drum error : 8
- ° Reel + Drum errors → A

#### 2) ATF adjustment

Used for the ATF bias adjustment.

#### 3) Insufficient voltage adjustment

Used for the insufficient voltage adjustment.

## 5-2 Electrical adjustments (Recorder /EVF sections)

### 5-2-1 SS5V adjustment

MODE	EE
M. EQ.	Digital voltmeter
TP/TRIG.	SYSCON SERVO C.B.A. TP503 (SS 5V)
ADJ.	SYSCON SERVO C.B.A. VR504 (SS 5V)
SPEC.	$5.1 \pm 0.05$ V

### 5-2-2 Undercut adjustment

\* Note: Perform the adjustment with the GRIP C.B.A. and the camera unit connected.

MODE	REC
M. EQ.	Digital voltmeter, Monitor TV
ADJ.	GRIP C.B.A. VR2961 (BATT)
SPEC.	BATT = $80 \pm 0.1$ H / $5.65 \pm 0.1$ V - $0.05$ V

#### Procedures:

- (1) Set the STEP 1 with a wireless remote controller.
- (2) Set the power source voltage at  $5.65 \pm 0.1$  V.
- (3) Adjust VR2961 so that the specified value appears on the monitor.

### 5-2-3 ATF bias adjustment

\* Note: Open the VIDEO C.B.A. for this adjustment.

SIGNAL	No signal
MODE	REC PAUSE
M. EQ.	Monitor TV
TOOL	Extension connector E
ADJ.	SYSCON SERVO C.B.A. VR503 (ATF)
SPEC.	ATF = $80 \pm 0.3$ H

#### Procedures:

- (1) Short-circuit TP503 (16K) and TP502 (47K) of SYSCON SERVO C.B.A. with a capacitor of about  $10 \mu\text{F}/10$  V.
- (2) Set the STEP 1 with a wireless remote controller.
- (3) Set REC PAUSE mode.
- (4) Adjust VR201 so that the specified value appears on the monitor TV.

### 5-2-4 Switching point adjustment

SIGNAL	Monoscope master
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	SYSCON SERVO C.B.A. TP506 (H-SW), VIDEO OUT
ADJ.	SYSCON SERVO C.B.A. VR501 (PG)
SPEC.	$7.0 \pm 1$ H

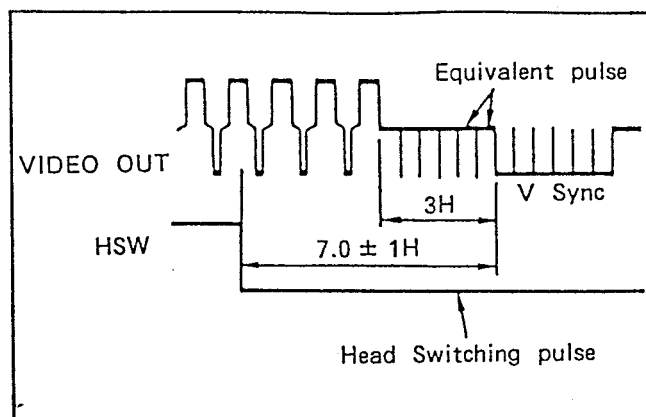


Fig. II-63

### 5-2-5 VIDEO AGC adjustment

SIGNAL	Color bar
MODE	EE
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP201 (Y 2)
ADJ.	AUDIO-VIDEO C.B.A. VR203 (Y AGC)
SPEC.	$1000 \pm 50$ mV

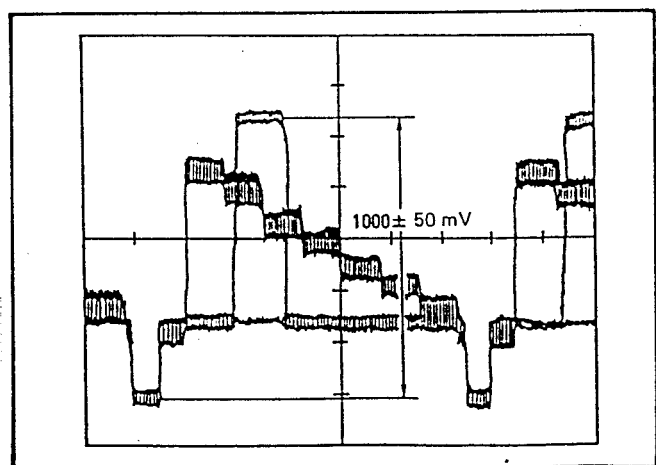


Fig. II-64 20 mV/10  $\mu\text{s}$

### 5-2-6 Y/C separation adjustment (1)

SIGNAL	Color bar signal
MODE	EE (LINE IN)
M. EQ.	Oscilloscope
TP/TRIG.	VIDEO C.B.A. TP206 (Y/C SEP)
ADJ.	VIDEO C.B.A. VR201 (Y/C SEP C)
SPEC.	Minimize chrominance component

#### Procedures:

- (1) Apply the signal of pattern generator.
- (2) Set the line in mode with Remote controller.
- (3) Short-circuit the TP's 205 and 302.
- (4) Adjust with the VR201.

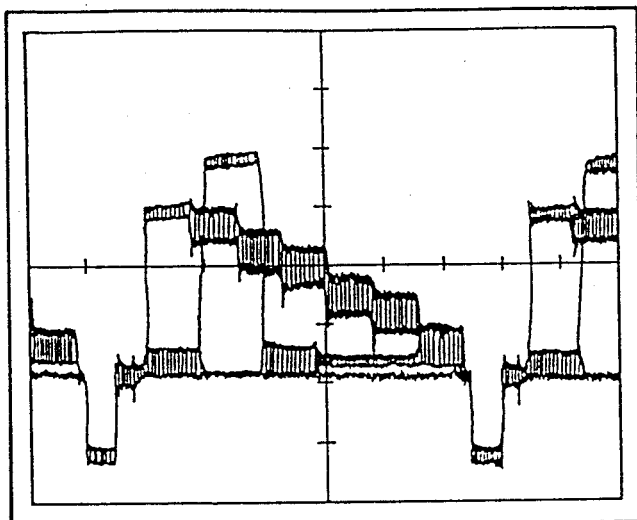


Fig. II-65

### 5-2-7 Y/C separation adjustment (2)

SIGNAL	Color bar signal
MODE	EE (LINE IN)
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO C.B.A. TP301 (Y/C SEP)
ADJ.	AUDIO C.B.A. VR210 (Y/C SEP Y) VR202 (Y/C SEP)
SPEC.	Minimize chrominance component

#### Procedures:

- (1) Apply the signal of pattern generator.
- (2) Set the line mode with Remote controller.
- (3) To minimize the chrominance component at the TP301, adjust VRs 210 → 202 → 210.

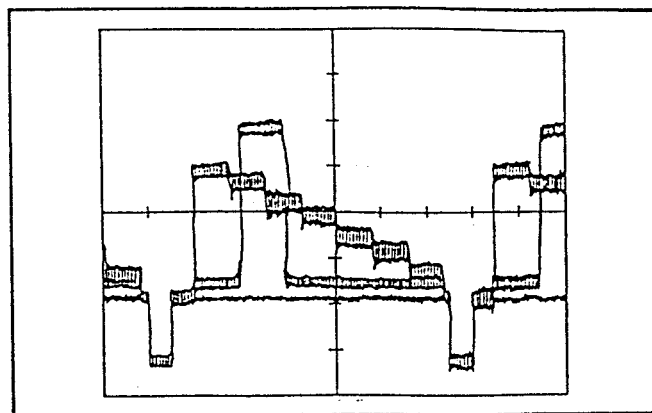


Fig. II-66

### 5-2-8 Video level adjustment

SIGNAL	Color bar
MODE	EE
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP206 (REC VIDEO)
ADJ.	AUDIO-VIDEO C.B.A. VR309 (VIDEO LEV.)
SPEC.	$500 \pm 20 \text{ mV}$

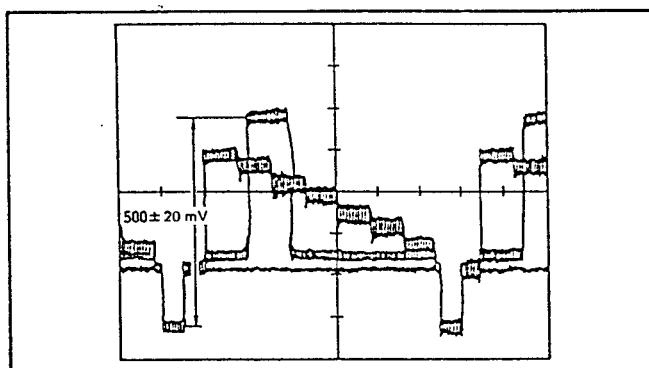


Fig. II-67

### 5-2-9 Y FM carrier (normal)

\* Note: Use a normal tape.

SIGNAL	No signal (Terminal-opened)
MODE	EE/NORMAL
M. EQ.	Oscilloscope, Frequency counter
TP/TRIG.	AUDIO-VIDEO C.B.A. TP207 (Y FM)
ADJ.	AUDIO-VIDEO C.B.A. VR206 (N CAR)
SPEC.	$4.38 \pm 0.04$ MHz

### 5-2-10 Y FM deviation (normal) adjustment

SIGNAL	100% white video signal
MODE	EE/NORMAL
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP207 (Y FM)
ADJ.	AUDIO-VIDEO C.B.A. VR208 (N DEV)
SPEC.	$0.19 \mu\text{s}/1 \text{ cycle}$ Graduation 3.8 at 50 ns Div.

- \* Notes:
1. Use a normal tape.
  2. Observe the signal waveform having the shortest cycle.
  3. After this adjustment, check (5-2-9 and 5-2-10) if the specified value is kept.

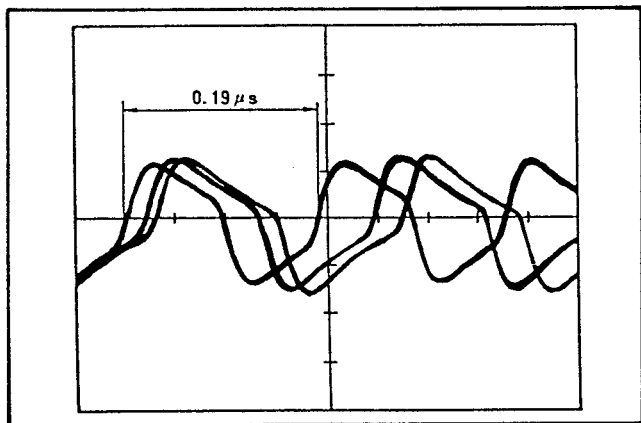


Fig. II-68 5 mV/50 ns

### 5-2-11 Y FM carrier (Hi8) adjustment

\* Note: Use a Hi8 tape.

SIGNAL	No signal (Terminal-opened)
MODE	EE/Hi8
M. EQ.	Oscilloscope, Frequency counter
TP/TRIG.	AUDIO-VIDEO C.B.A. TP207 (Y FM)
ADJ.	AUDIO-VIDEO C.B.A. VR204 (Hi8 CAR)
SPEC.	$5.99 \pm 0.04$ MHz

### 5-2-12 Y FM deviation (Hi8) adjustment

- \* Notes:
1. Use a normal tape.
  2. Observe the signal waveform having the shortest cycle.
  3. After this adjustment, check (5-2-11 and 5-2-12) if the specified value is kept.

SIGNAL	100% white video signal
MODE	REC/Hi8
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP207 (Y FM)
ADJ.	AUDIO-VIDEO C.B.A. VR207 (Hi8 DEV)
SPEC.	$0.3975 \mu\text{s}/3 \text{ cycle}$ Graduation 7.95 at 50 ns

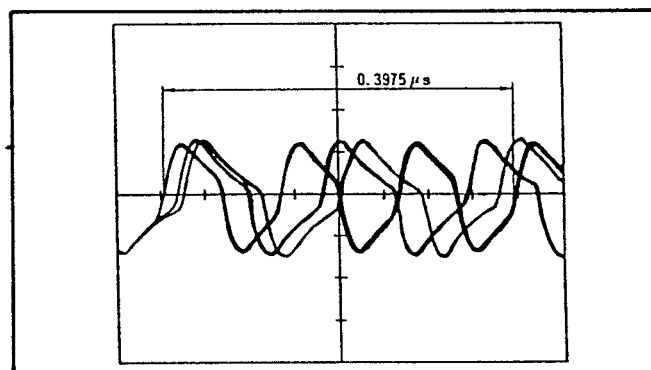


Fig. II-69 5 mV/50 ns

### 5-2-13 PB Y level adjustment (1)

SIGNAL	Self-record/playback tape (HiME), color bar signal
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP202 (Y1)
ADJ.	AUDIO-VIDEO C.B.A. VR306 (PB Y1)
SPEC.	$500 \pm 10$ mV

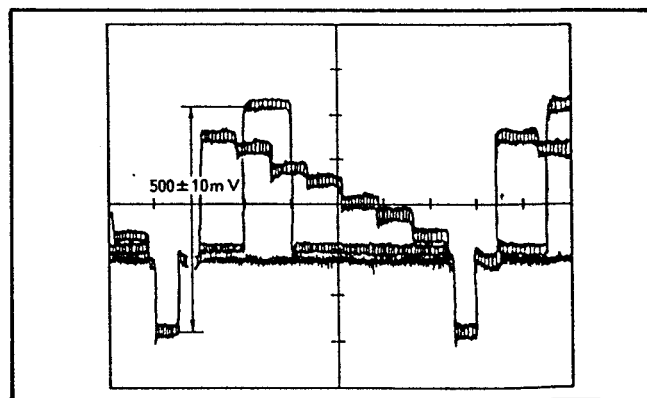


Fig. II-70

## 5-2-14 PB Y level adjustment (2)

SIGNAL	Self-record/playback tape (HiME), color bar signal
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP201 (Y2)
ADJ.	AUDIO-VIDEO C.B.A. VR308 (PB Y2)
SPEC.	$1.0 \pm 0.05$ V

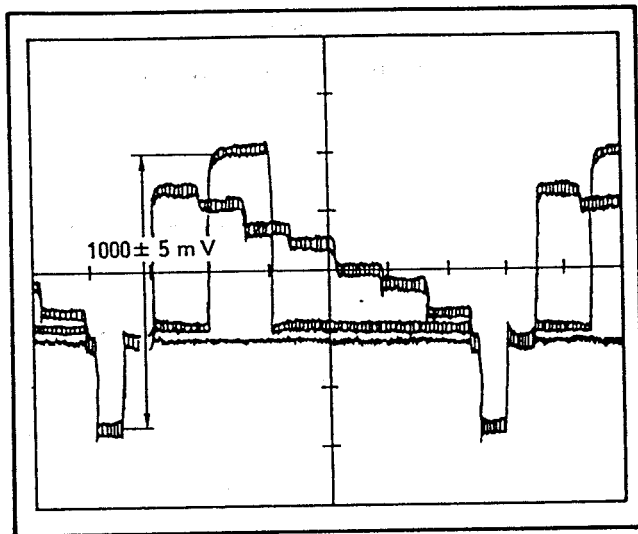


Fig. II-71

## 5-2-15 Peaking adjustment

SIGNAL	V sweep master (Hi8)
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	Extension cable connector I ④ (PB RF) ⑤ (SW PULSE)
ADJ.	HEAD AMP C.B.A. VR102 (CH-1), VR101 (CH-2)
SPEC.	4.5 MHz : 8.5 MHz = 3 : 2

\* Note: Perform this adjustment only after replacing an upper drum assembly, drum assembly, or a HEAD AMP C.B.A.

Procedures:

- (1) Connect the extension cable I.
- (2) Playback the V sweep master (Hi8).
- (3) Observing the waveform at pin 4 of extension cable I, trigger the pin 5.
- (4) Observing the waveform of CH-1 (High period), adjust it as specified.
- (5) Observing the waveform of CH-2 (Low period), adjust it as specified.

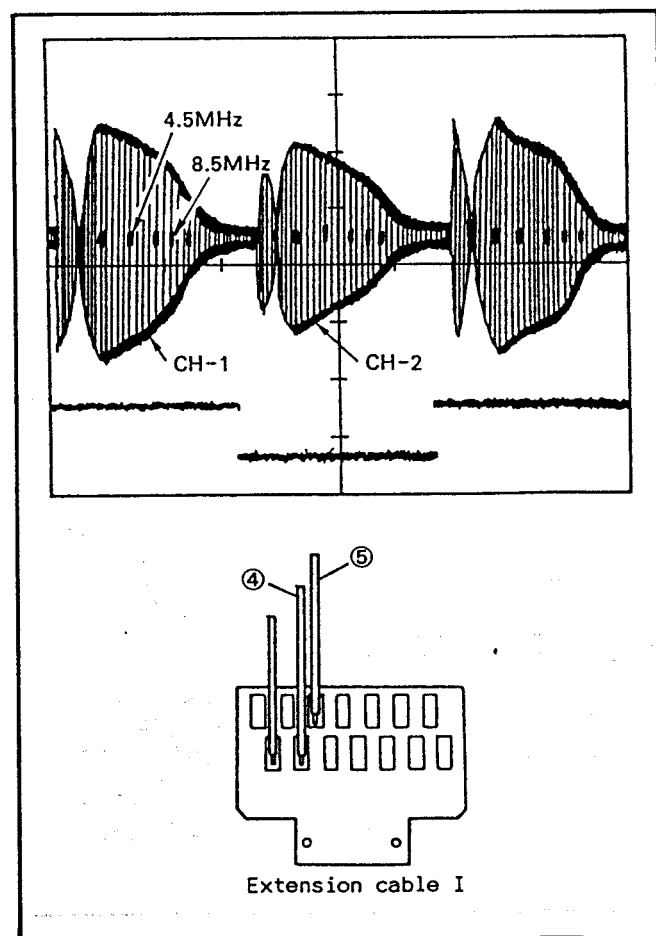


Fig. II-72

## 5-2-16 Recording current adjustment

### (1) Luminance signal

SIGNAL	No signal (Terminal-opened)
MODE	REC/Hi8 ME tape
M. EQ.	Oscilloscope
TP/TRIG.	HEAD AMP C.B.A. TP101 (REC CURR)
ADJ.	VIDEO C.B.A. VR305 (REC Y)
SPEC.	250 mVp-p

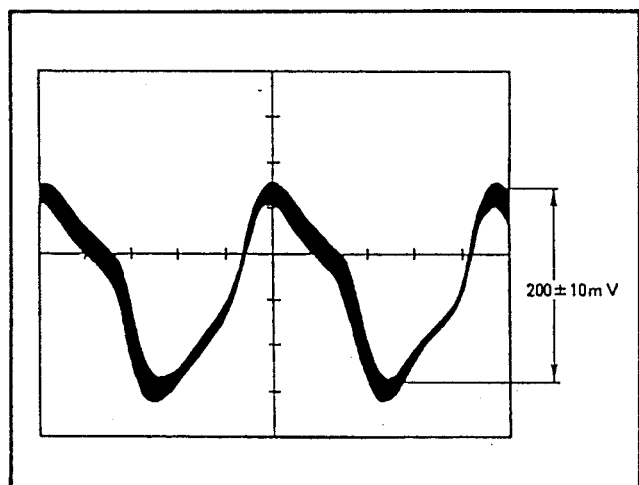


Fig. II-73 5 mV/50 ns

### (2) Chrominance, audio and ATF signals

MODE	REC/Hi8 ME tape
M. EQ.	Oscilloscope
TP/TRIG.	HEAD AMP C.B.A. TP101 (REC CURR)
TOOL	Recording current checker (DY9-1056-000)

\* Note: Connect the TP101 with the recording current checker with a probe (1:1).

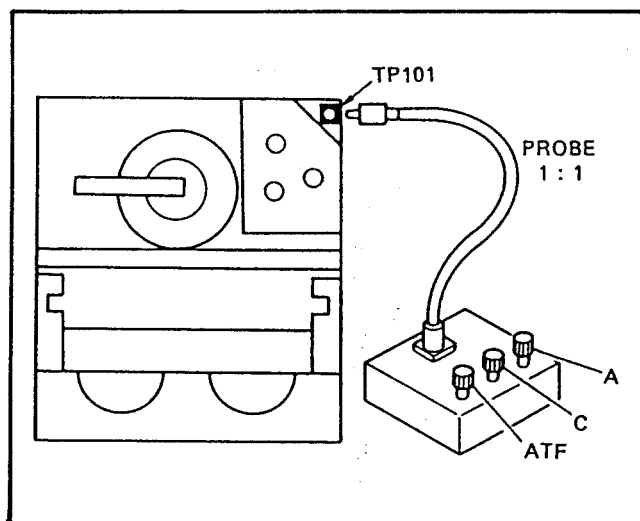


Fig. II-74

### ° Chrominance

SIGNAL	Color bar
ADJ.	VIDEO C.B.A. VR304 (REC C)
SPEC.	$2.3 \pm 0.1$ Vp-p

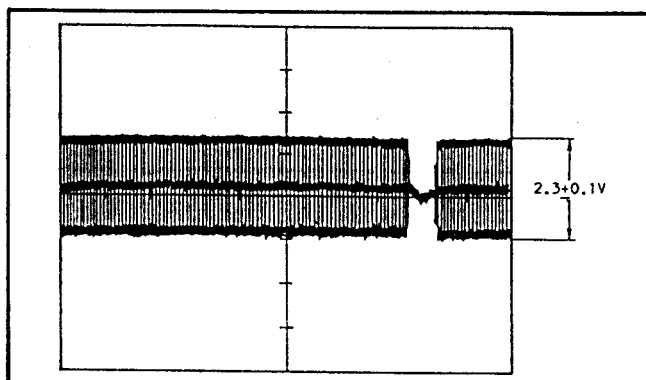


Fig. II-75 50 mV/2 ms

### ° Audio

SIGNAL	100% white video signal
ADJ.	VIDEO C.B.A. VR302 (REC AFM)
SPEC.	$1.6 \pm 0.1$ Vp-p

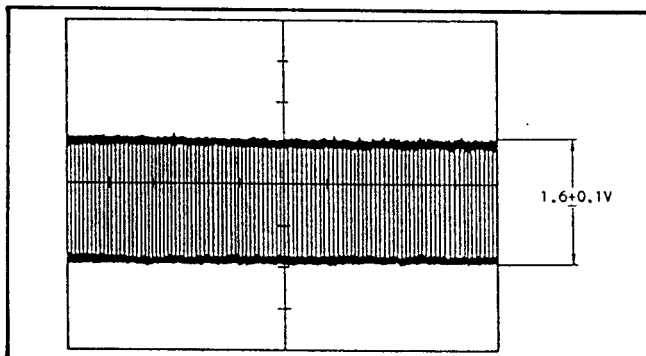


Fig. II-76 50 mV/2 ms

### ° ATF

SIGNAL	100% white video signal
ADJ.	VIDEO C.B.A. VR303 (REC ATF)
SPEC.	DC $0.8 \pm 0.1$ V

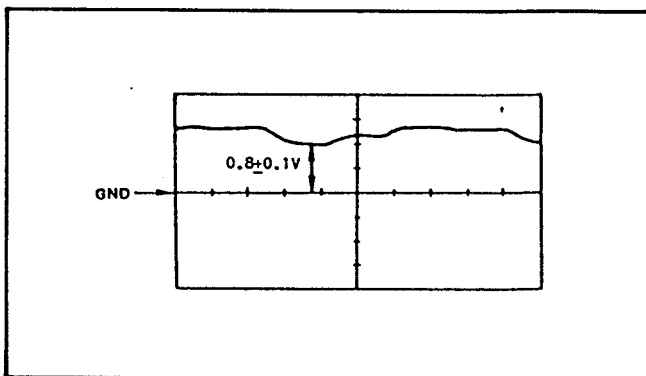


Fig. II-77 50 mV/10 ms



### 5-2-17 1.5 MHz carrier frequency adjustment

SIGNAL	No signal
MODE	REC (CAMERA Mode)
M. EQ.	Frequency counter (Connect via an oscilloscope)
TP/TRIG.	AUDIO VIDEO C.B.A. TP803 (1.5M CAR.)
ADJ.	AUDIO VIDEO C.B.A. VR805 (1.5M CAR.)
SPEC.	1.5 MHz $\pm$ 10 kHz

### 5-2-18 1.7 MHz carrier frequency adjustment

SIGNAL	No signal
MODE	REC (CAMERA Mode)
M. EQ.	Frequency counter (connect via an oscilloscope)
TP/TRIG.	AUDIO VIDEO C.B.A. TP804 (1.7M CAR.)
ADJ.	AUDIO VIDEO C.B.A. VR806 (1.7M CAR.)
SPEC.	1.7 $\pm$ 5 kHz

### 5-2-19 Carrier balance adjustment

- \* Notes:
1. Use a probe of 1:1.
  2. To facilitate the adjustment, use the UNCAL.

SIGNAL	No signal
MODE	REC (CAMERA Mode)
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO VIDEO C.B.A. TP803 (1.5M CAR.) AUDIO VIDEO C.B.A. center position of VR808 (CAR. BAL.)
ADJ.	AUDIO VIDEO C.B.A. VR808 (CAR. BAL.)
SPEC.	Level of VR808 (center): level of TP808 = 1:3

### 5-2-20 Matrix level adjustment

SIGNAL	L-channel input (Open R-channel)
MODE	REC (CAMERA mode)
TOOL	Headphone
ADJ.	AUDIO-VIDEO 1 C.B.A. VR807 (MATRIX LEVEL)
SPEC.	Sound of L-channel only is emitted from a headphone.

### Procedures:

- (1) Using the extension connector N, apply a signal to CN801 (AUDIO-VIDEO C.B.A.) from the following sources. (See the Fig. II-78.)
- (2) Plug a headphone to the headphone jack.
- (3) While listening to a sound from the headphone, adjust the VR807 so that the sound is emitted only from the L-channel.

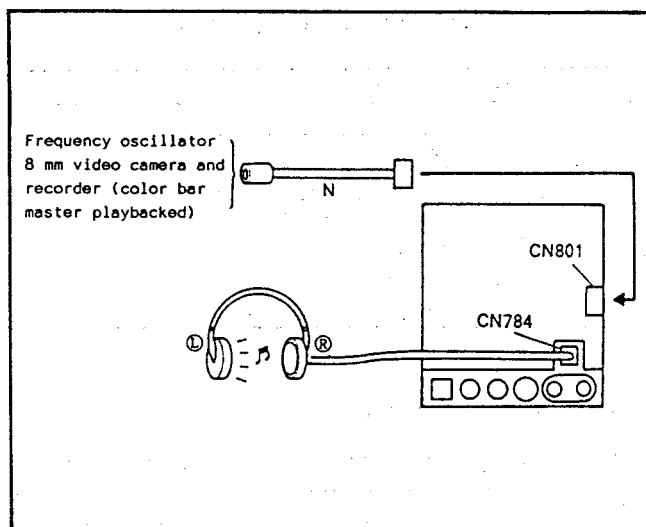


Fig. II-78

### 5-2-21 1.5 MHz deviation adjustment

SIGNAL	Monoscope master (DY9-1062-000)
MODE	PLAYBACK
M. EQ.	Oscilloscope
TP/TRIG.	AUDIO-VIDEO C.B.A. TP903 (1.5M DEV.)
ADJ.	AUDIO-VIDEO C.B.A. VR803 (1.5M DEV.)
SPEC.	1 Vp-p

### 5-2-22 1.7 MHz deviation adjustment

SIGNAL	L-channel input (Open R-channel)
MODE	Self-record/playback tape
TOOL	Headphone
ADJ.	AUDIO-VIDEO C.B.A. VR804 (1.7M DEV.)
SPEC.	Sound of L-channel only is emitted from a headphone.

### Procedures:

- (1) Perform 5-2-20 Matrix level adjustment.
- (2) Make recording after the adjustment.
- (3) Playback it.
- (4) While listening to the sound from the headphone, adjust the VR804 so that the sound is emitted only from the L-channel.

### 5-2-23 Free-run frequency adjustment

SIGNAL	No signal (Terminal-opened)
MODE	LINE IN
M. EQ.	Oscilloscope, frequency counter
TP/TRIG.	GRIP C.B.A. TP2901 (HD)
ADJ.	GRIP C.B.A. VR2902 (H. PHASE)
SPEC.	15.90 $\pm$ 0.05 KHz

### 5-2-24 Vertical amplitude adjustment

SIGNAL	Monoscope master (DY9-1062-000)
MODE	PLAY
M. EQ.	EVF, Monitor TV
ADJ.	GRIP C.B.A. VR2901 (V-SIZE)
SPEC.	Circle on monoscope master free from distortion. Absence of incongruity in comparison with monitor TV screen

### 5-2-25 Rotation and centering adjustment

SIGNAL	Monoscope master (DY9-1062-000)
MODE	PLAY
M. EQ.	EVF
ADJ.	Deflection yoke, centering magnet
SPEC.	Screen is not tilted and is located right at the center.

#### Procedures:

- (1) Loosen the fastening ring to enable the deflection yoke to be moved.
- (2) Turn the deflection yoke to correct screen tilt.
- \* Note: Move the deflection yoke completely toward the CRT screen.
- (3) Tighten the fastening ring.
- \* Note: The fastening ring must be tightened so that the centering magnet can be moved.
- (4) Adjust the centering magnet so as to locate the picture at the center.
- (5) Tighten the fastening ring completely.
- \* Note: Pay attention not to overtighten the ring.
- (6) Fix the centering magnet by applying a paint or the like (in 180° direction, at 2 points.).

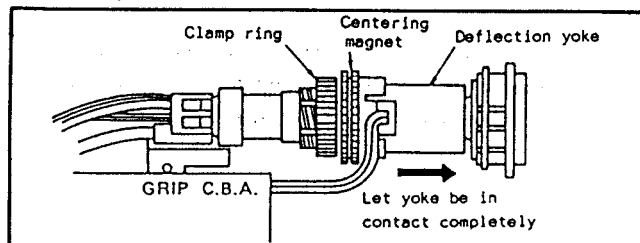


Fig. II-79

### 5-2-26 Brightness adjustment

SIGNAL	Self-record/playback tape (grayscale)
MODE	PLAY
M. EQ.	EVF
ADJ.	GRIP C.B.A. VR2904 (BRIGHT)
SPEC.	Distinguishable down to 11th step grayscale

### 5-2-27 Focus adjustment

MODE	Lens-capped (character display)
M. EQ.	EVF
ADJ.	GRIP C.B.A. VR2903 (FOCUS)
SPEC.	EVF character under optimum focus

### 5-2-28 Character position of character generator adjustment

- \* Note: Display characters with a wireless remote controller.

SIGNAL	Color bar signal
MODE	EE
M. EQ.	Monitor TV
TP/TRIG.	GRIP C.B.A. VC2941 (CG SIZE)
SPEC.	Lowermost digit of counter located between red and blue color bars

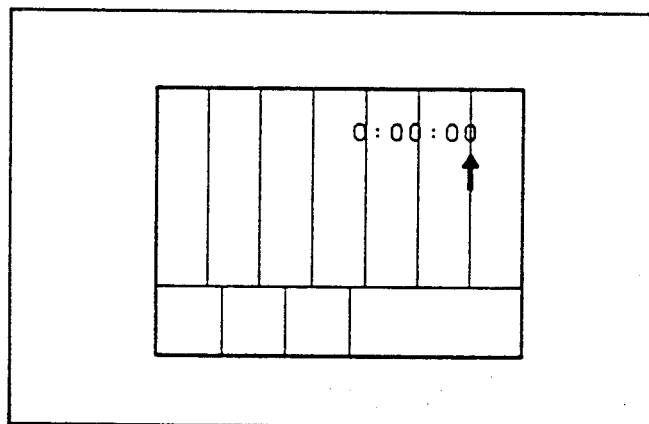


Fig. II-80

### 5-2-29 JOG chrominance phase adjustment

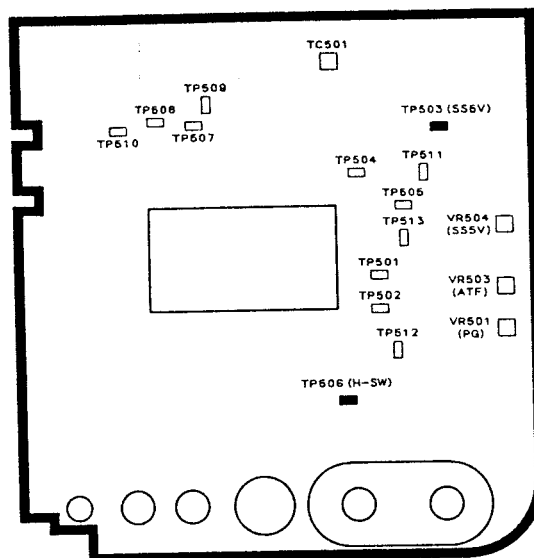
SIGNAL	Red signal (pattern generator)
MODE	Search
M. EQ.	Monitor
ADJ.	211 (JOG BURST)
SPEC.	Eliminate the block stripes

#### Procedures:

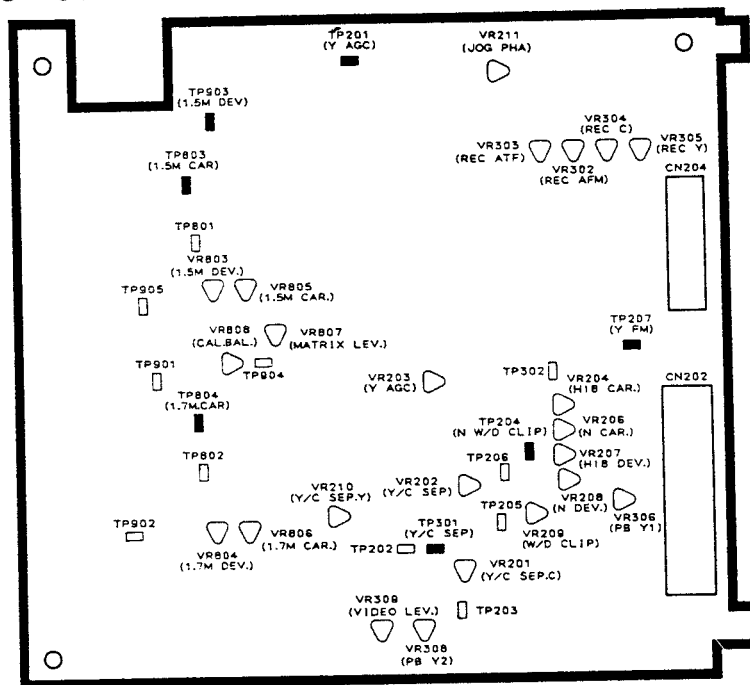
- (1) Record red signal in LP mode.
- (2) Playback and search the recorded part.
- (3) Eliminate the black stripes on the screen.

Locations of TP/VR/VC

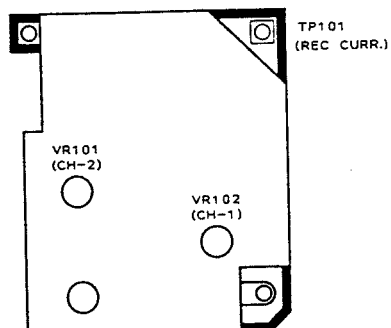
SYS CON-SERVO C. B. A.



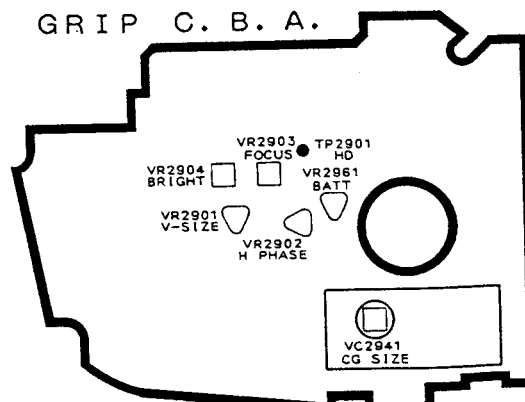
AUDIO-VIDEO C. B. A.



HEAD AMP C. B. A.



GRIP C. B. A.



## 6. Mechanical Adjustment of Recorder Section

For mechanical adjustment of the recorder section, refer to the MC-4B Service Manual issued separately.

### 6-1 Mechanical adjustments

#### ① Service mode (step 2)

The service mode (step 2) is set for tracking fine adjustment.

However, sometimes the waveform does not match 70% RF envelope output. In such case, turn VR503 (on SYSCON SERVO C.B.A.) until the waveform is adjusted to 70%.

(After the adjustment, perform 5-2-3 ATF bias adjustment. Then, set the VR503 to the original position.)

#### ② Additional item for fine tracking adjustment in 4-3.

Perform the steps from (1) through (4) as written on the manual.

Then, add the following step of adjustment (5) peculiar to the Hi8 type.

- (5) Slightly turn the No. 6 guide clockwise so that  $B:C = 4:3.5$ . (See Fig. II-81.)

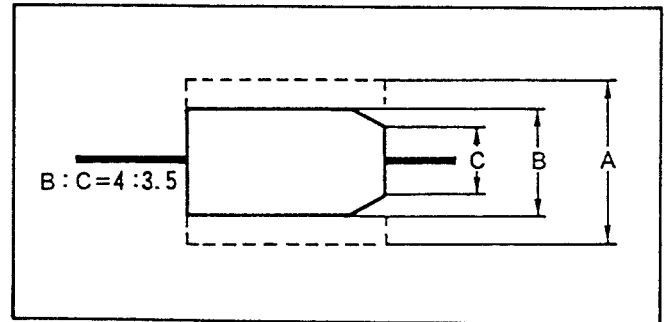


Fig. II-81

### 6-2 How to drive loading motor

To operate the loading motor independently, apply the power directly. (Fig. II-82)

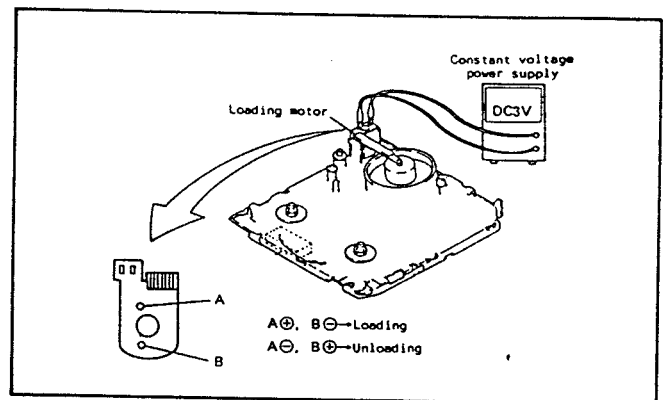


Fig. II-82

### 6-3 Replacement of upper drum

Refer to the Service Manual for MC-4B. (Replacement of upper drum, 3-20)

\* ② parts in the Fig. II-83 are plug-in type. (Not soldered as in the conventional models)

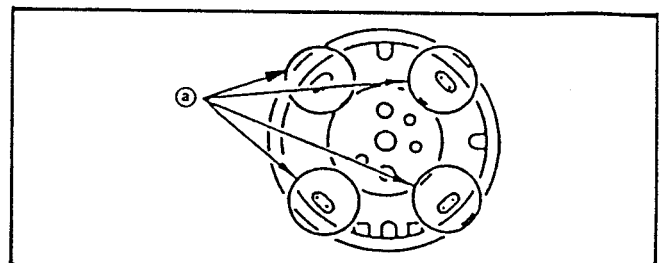
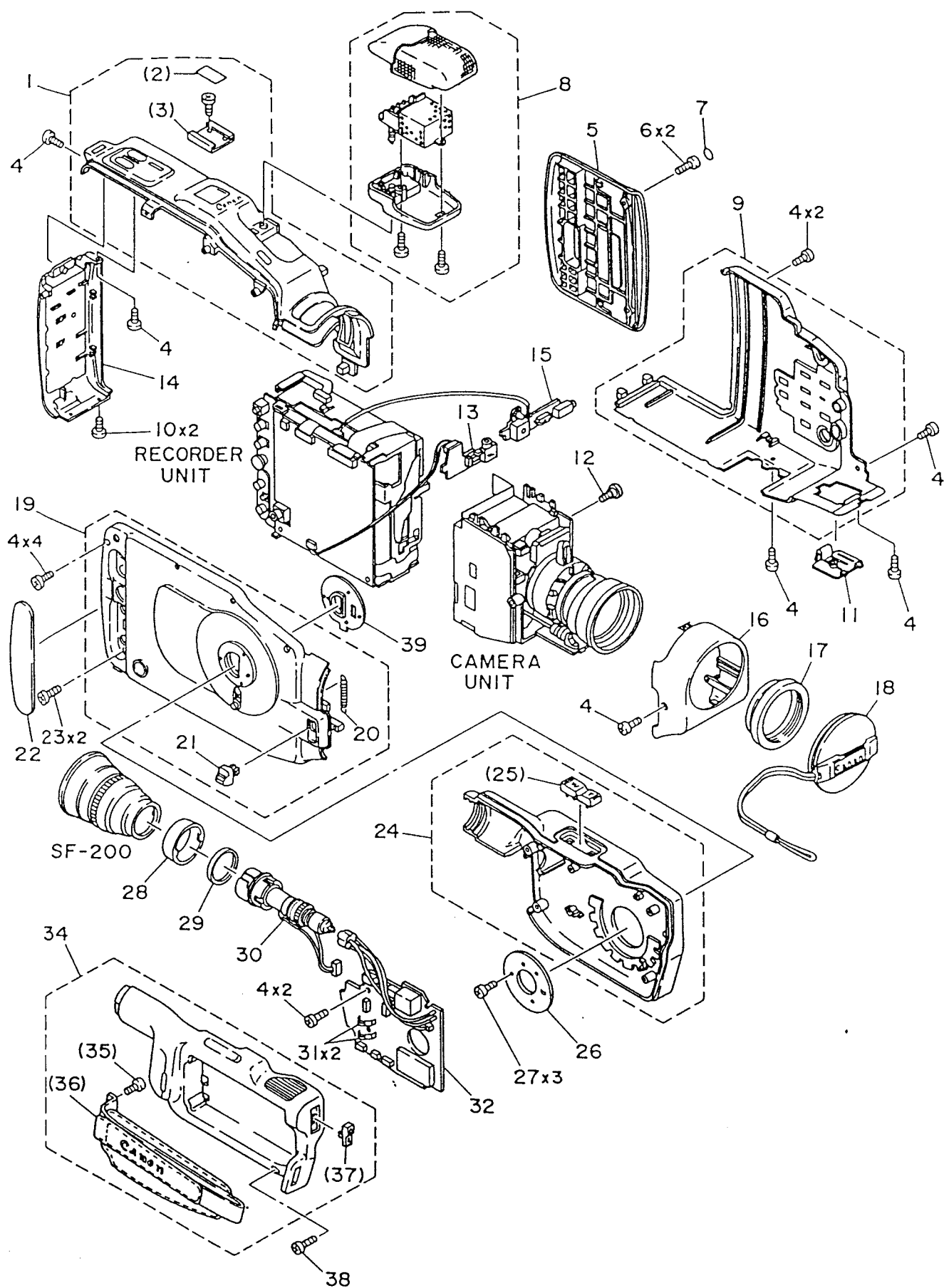


Fig. II-83


## Casing Parts Section



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### EXPLODED VIEWS

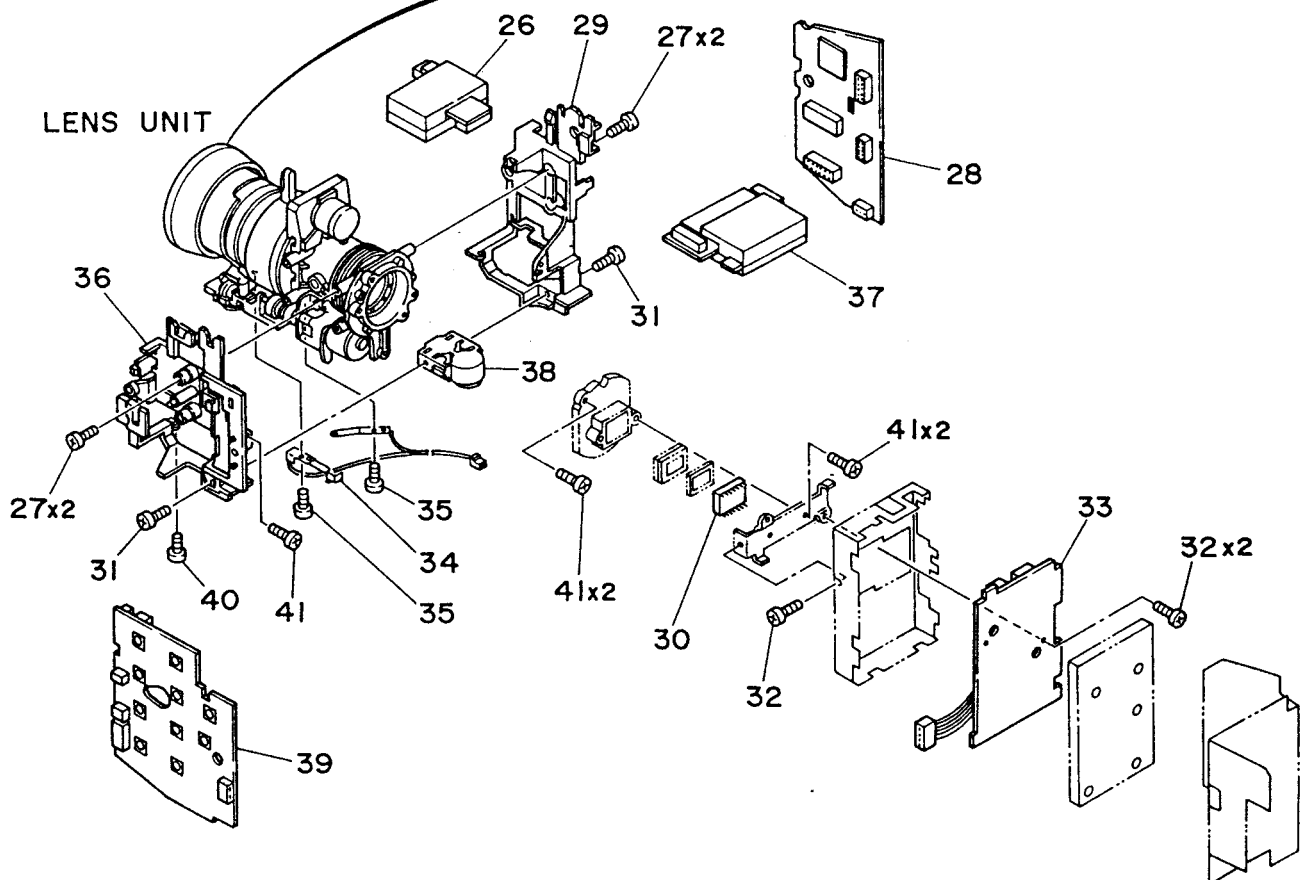
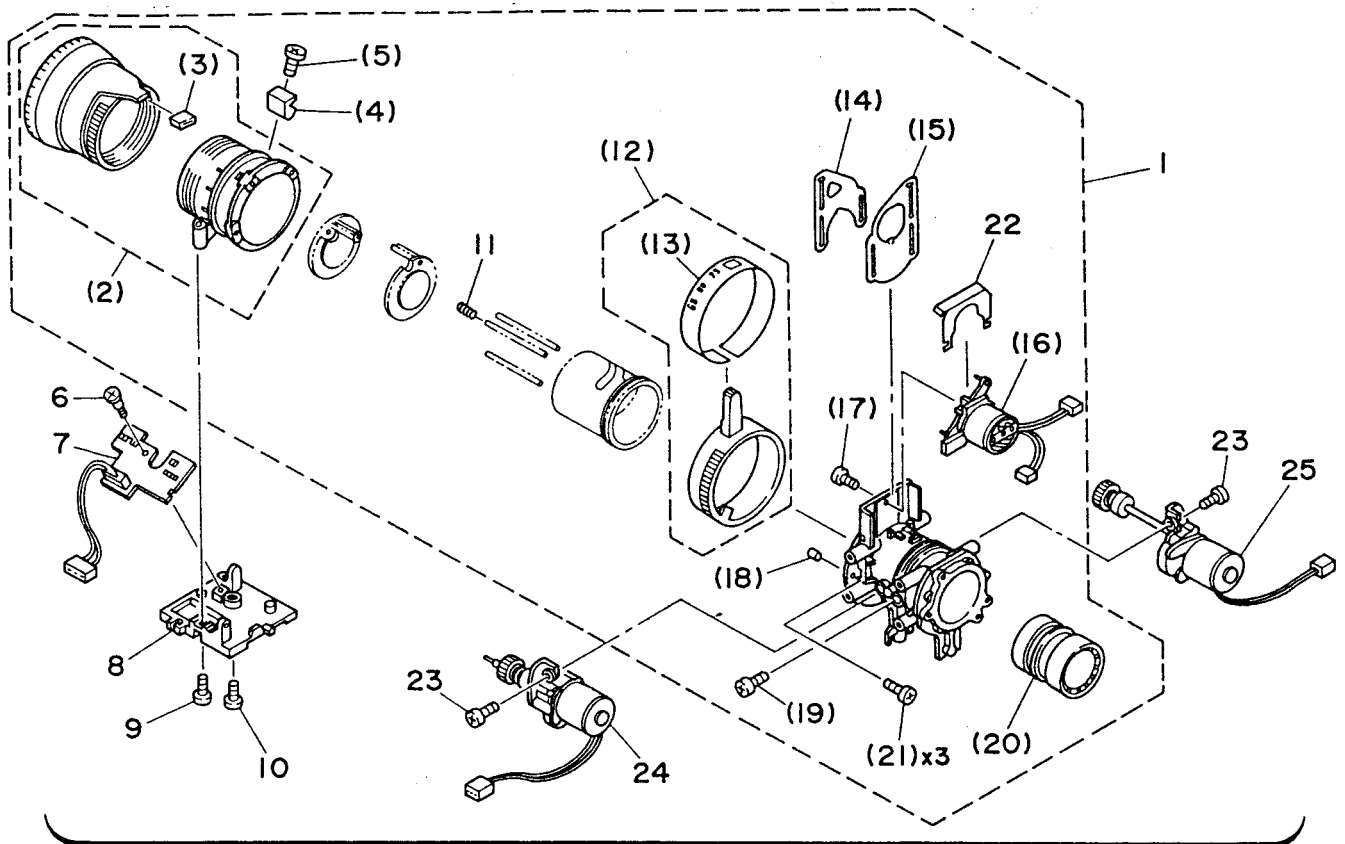
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1. ESPECIALLY CRITICAL PARTS IN THE POWER CIRCUIT BLOCK SHOULD NOT BE REPLACED WITH OTHER MARKS.  
CRITICAL PARTS ARE MARKED WITH  IN THIS ELECTRICAL PARTS LIST.
2. THE NUMBERS INDICATED ON THE CONNECTORS DO NOT CORRESPOND TO THE SYMBOL NUMBERS.  
PLEASE CHECK THE CORRECT SYMBOL NUMBERS OF THE CONNECTORS ON THE INTERCONNECTION SCHEMATIC DIAGRAM.

## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY1-5009-000 000	B	1	TOP COVER ASS'Y	VCC858 ONLY
	DY2-1277-000 000	B	1	TOP COVER ASS'Y	E800HiF ONLY
2	DA1-2489-000 000	B	1	SHEET, ACCESSORY SHOE	
3	DA1-2486-000 000	B	1	SHOE, ACCESSORY	
4	XA4-7200-459 000	F	15	SCREW, CROSS-RECESS, PH	
5	DF1-1021-000 000	B	1	COVER, CASSETTE	VCC858 ONLY
6	XA1-7200-307 000	F	2	SCREW, CROSS-RECESS, PH	
7	DA1-2514-000 000	B	2	SEAL	VCC858 ONLY
8	DH9-0543-000 000	B	1	MICROPHONE ASS'Y	VCC858 ONLY
9	DF1-1020-000 000	B	1	RIGHT COVER ASS'Y	VCC858 ONLY
	DF1-0749-000 000	B	1	RIGHT COVER ASS'Y	E800HiF ONLY
10	XA9-0449-000 000	F	2	SCREW, CROSS-RECESS	
11	DA1-4736-000 000	B	1	COVER, BATTERY	VCC858 ONLY
12	DA1-1948-000 000	F	1	SCREW, CROSS-RECESS	
13	DG1-1230-000 000	C	1	MIC. JACK C.B.A.	
14	DY1-5010-000 000	B	1	COVER, REAR	VCC858 ONLY
	DY2-1279-000 000	B	1	COVER, REAR	E800HiF ONLY
15	DG1-1236-000 000	C	1	REMOCON C.B.A.	
16	DA1-4734-000 000	B	1	COVER LENS	VCC858 ONLY
17	DA1-1702-000 000	B	1	HOOD	
18	DF1-0865-000 000	B	1	CAP, LENS	VCC858 ONLY
19	DY1-5011-000 000	B	1	LEFT COVER ASS'Y	VCC858 ONLY
20	DSL-5186-000 000	C	1	SPRING	
21	DA1-4727-000 000	B	1	KNOB, GRIP	VCC858 ONLY
22	DA1-4726-000 000	B	1	CAP, AV	VCC858 ONLY
23	XA1-6200-409 000	F	2	SCREW, CROSS-RECESS, PH	
24	DY2-1219-000 000	B	1	RIGHT COVER, GRIP	VCC858 ONLY
25	DA1-2460-000 000	B	1	KNOB, T/W	
26	DA1-2461-000 000	C	1	PLATE, GRIP (1)	
27	XA9-0503-000 000	F	3	SCREW, CROSS-RECESS, PH	
28	DA1-2457-000 000	B	1	RING, E.V.F.	VCC858 ONLY
29	DA1-1864-000 000	B	1	RING, RUBBER	
30	DY2-1159-000 000	D	1	CRT ASS'Y	
31	DA1-2463-000 000	C	2	TERMINAL, BATTERY	
32	DG1-1260-000 000	C	1	GRIP C.B.A.	
34	DG1-1362-000 000	B	1	LEFT COVER, GRIP	VCC858 ONLY
35	XA9-0435-000 000	F	2	SCREW, CROSS-RECESS, PH	
36	DA1-4132-000 000	B	1	STRAP, HAND	VCC858 ONLY
37	DA1-2517-000 000	B	1	KNOB, BATTERY EJECT	VCC858 ONLY
38	XA4-9260-709 000	F	4	SCREW, CROSS-RECESS, PH	
39	DA1-3659-000 000	C	1	PLATE, GRIP (2)	

# Lens/Camera Unit Section

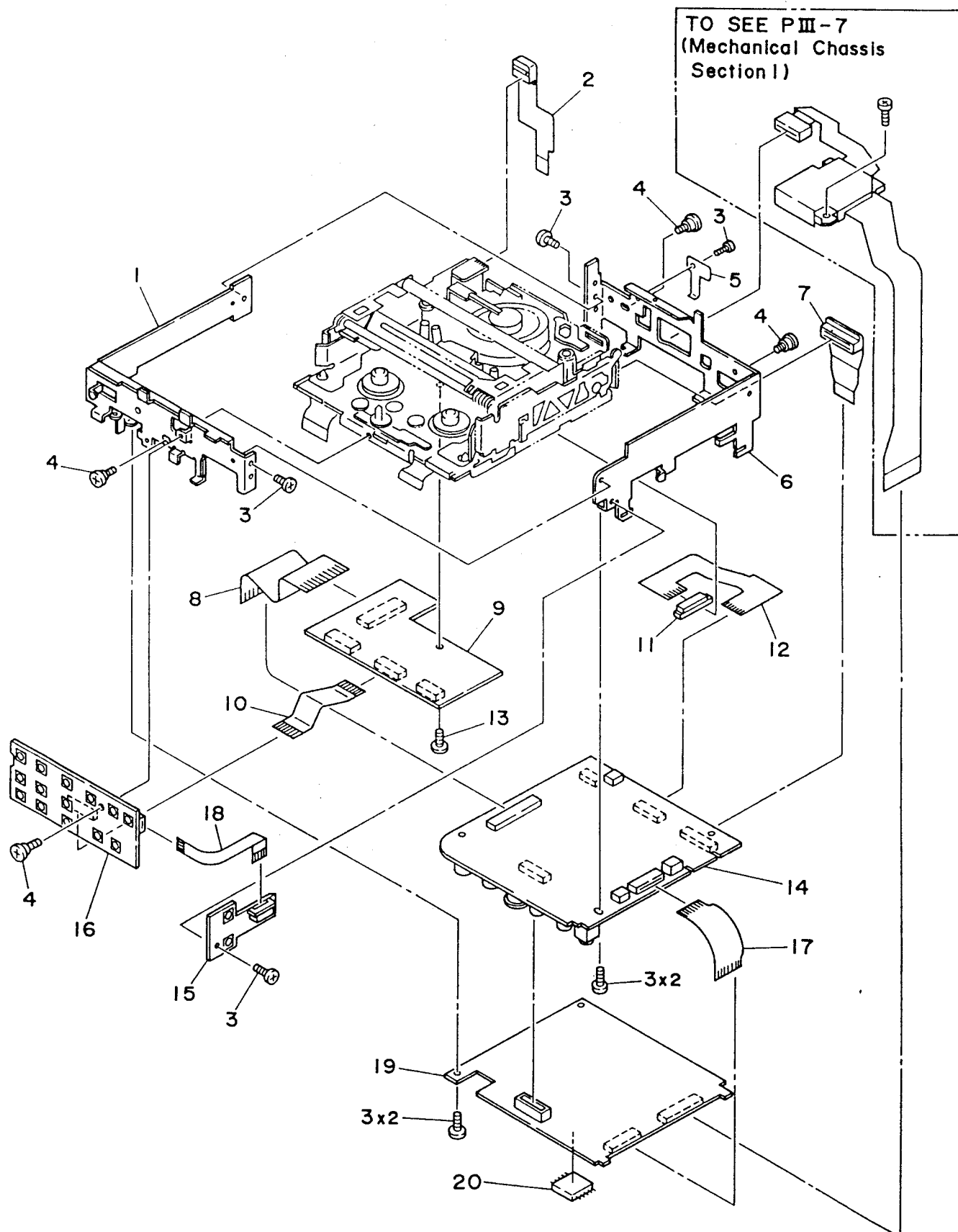




## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY1-7128-000 000	C	1	ZOOM LENS ASS'Y	
2	DY1-7129-000 000	C	1	FOCUS LENS ASS'Y	
3	DA7-1734-000 000	C	1	STOPPER, RUBBER	
4	DA7-1724-000 000	C	1	STOPPER, NEARDISTANCE	
5	XA4-4200-507 000	F	1	SCREW, CROSS-RECESS, PH	
6	X96-1723-500 000	F	1	SCREW	
7	YG9-5021-000 000	C	1	PHOTO REFLECTOR C.B.A.	
8	YA1-0061-000 000	C	1	HOLDER, LITHIUM BATTERY	
9	XA4-2170-707 000	F	1	SCREW, CROSS-RECESS	
10	XA4-4170-407 000	F	1	SCREW, CROSS-RECESS, PH	
11	DS1-5198-000 000	C	1	SPRING, COIL	
12	DY1-7130-000 000	C	1	ZOOM RING ASS'Y	
13	YA1-0064-000 000	B	1	SHEET, ZOOM	
14	DA7-1792-000 000	C	1	BLIND, IG METER (B)	
15	YF1-0004-000 000	C	1	BLIND, IG METER (A)	
16	YH8-0002-000 000	C	1	IG METER	
17	XA4-4170-457 000	F	1	SCREW, CROSS-RECESS, PH	
18	DA7-1458-000 000	C	1	DUMPER, RUBBER	
19	XB4-6260-607 000	F	1	SCREW M2.6X6	
20	DG9-3384-000 000	C	1	RELAY LENS ASS'Y	
21	XA4-9170-557 000	F	3	SCREW, CROSS-RECESS, PH	
22	DA7-1739-000 000	C	1	COVER, IG METER	
23	X96-1723-610 000	F	2	SCREW, SLOTTED, SHOULDER	
24	YG9-5023-000 000	C	1	PZ MOTOR ASS'Y	
25	YG9-5022-000 000	C	1	AF MOTOR ASS'Y	
26	DH3-0018-000 000	C	1	DC/DC CONVERTER	
27	XA4-7200-609 000	F	4	SCREW, CROSS-RECESS	
28	DG1-1250-000 000	C	1	PROCESS C.B.A.	
29	DA1-3602-000 000	C	1	HOLDER, CAMERA (2)	
30	DH4-0242-000 000	B	1	CCD MN3761FSZ	
31	XA4-7200-459 000	F	2	SCREW, CROSS-RECESS, PH	
32	XA1-7200-307 000	F	3	SCREW, CROSS-RECESS, PH	
33	DG1-1249-000 000	C	1	SENSOR C.B.A.	
34	DF1-0754-000 000	C	1	LITHIUM ASS'Y	
35	XA4-7200-359 000	F	2	SCREW, CROSS-RECESS, PH	
36	DA1-3601-000 000	C	1	HOLDER, CAMERA (1)	
37	DG1-1261-000 000	C	1	DIGITAL MEMORY C.B.A.	
38	DA1-3610-000 000	F	1	PLATE, TRIPOD	
39	DG1-1262-000 000	C	1	CAMERA KEY C.B.A.	E800HiE ONLY
	DG1-1263-000 000	C	1	CAMERA KEY C.B.A.	E800HiF ONLY
40	XA4-9170-609 000	F	1	SCREW, CROSS-RECESS, PH	
41	XA4-9200-709 000	F	5	SCREW, CROSS-RECESS, PH	

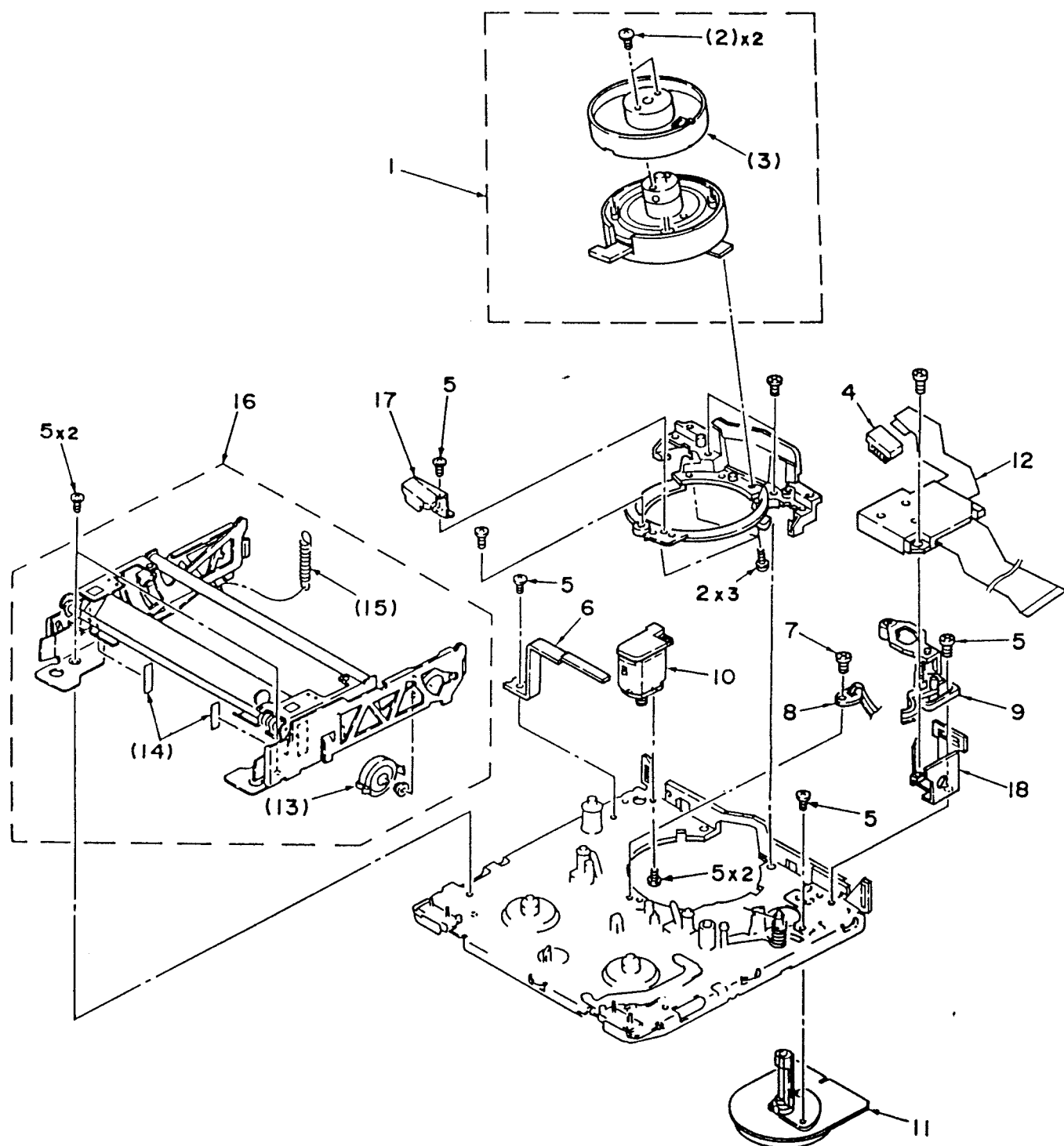
## Recorder Unit Section



## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DF1-0759-000 000	C	1	HOLDER (1), RECORDER	
2	DF1-0757-000 000	C	1	PRINTED CORD ASS'Y	
3	XA1-7200-307 000	F	9	SCREW, CROSS-RECESS, PH	
4	DA1-1900-000 000	F	4	SCREW, CROSS-RECESS	
5	DA1-2349-000 000	C	1	PLATE, GROUND	
6	DA1-3617-000 000	C	1	HOLDER (2), RECORDER	
7	DF1-0756-000 000	C	1	PRINTED CORD ASS'Y	
8	DH2-1242-000 000	C	1	PRINTED CORD	
9	DG1-1252-000 000	C	1	CJ C.B.A.	
10	DH2-1241-000 000	C	1	PRINTED CORD	
11	DH2-1250-000 000	C	1	CONNECTOR 11P	
12	DH2-1229-000 000	C	1	PRINTED CORD	
13	XA4-7200-459 000	F	1	SCREW, CROSS-RECESS, PH	
14	DG1-1257-000 000	C	1	SYSCON SERVO C.B.A.	
15	DG1-1248-000 000	C	1	POWER EJECT C.B.A.	
16	DG1-1228-000 000	C	1	RECORDER KEY C.B.A.	
17	DH2-1230-000 000	C	1	PRINTED CORD	
18	DH2-1244-000 000	C	1	PRINTED CORD	
19	DG1-1258-000 000	C	1	AUDIO VIDEO C.B.A.	
20	DH4-0301-000 000	C	1	JOG C.B.A.	

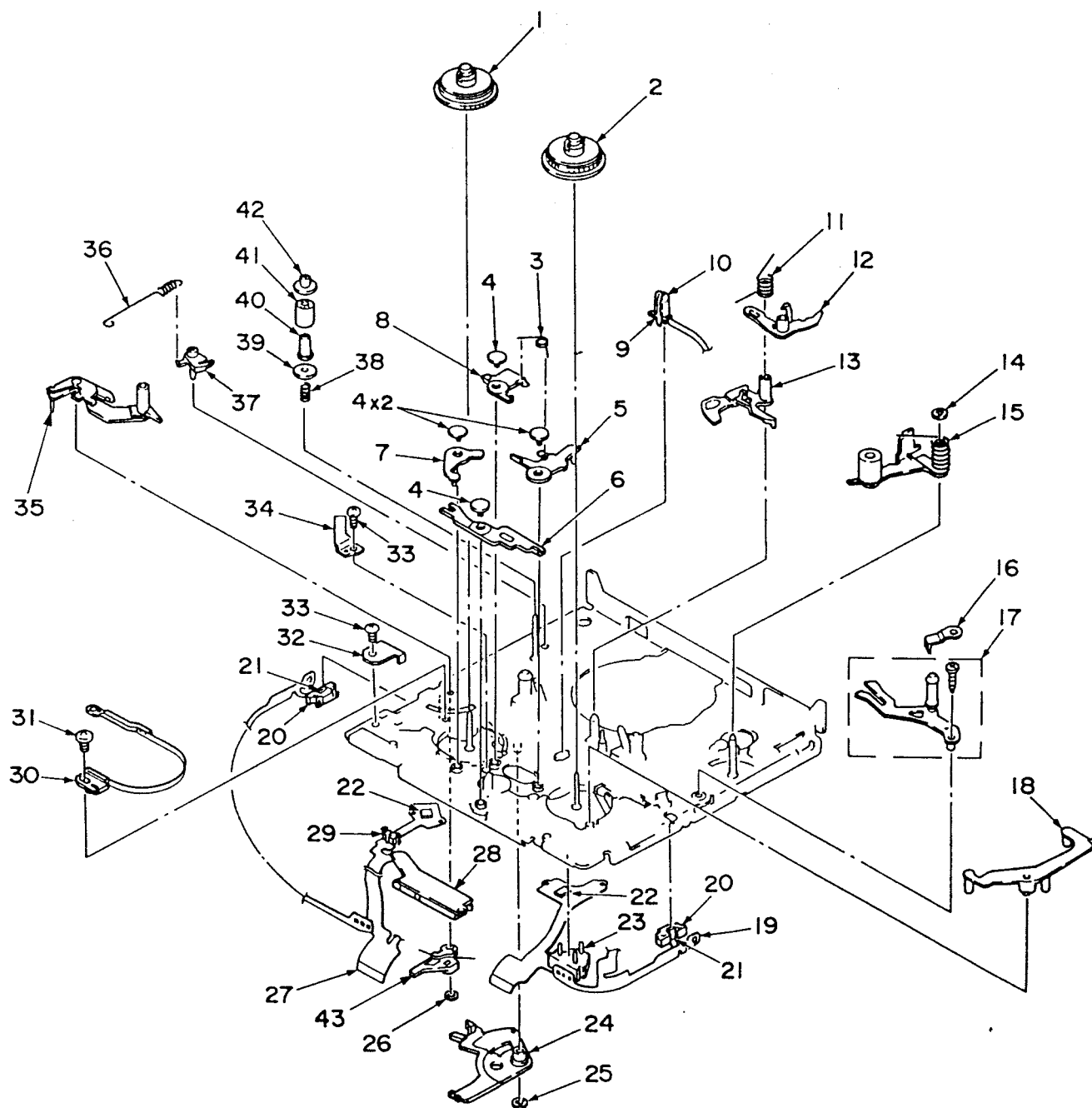
## Mechanical Chassis Section I



## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY4-2930-000 000	E	1	DRUM ASS'Y	
2	DY4-2730-000 000	F	5	SCREW, CROSS-RECESS	
3	DY4-2931-000 000	E	1	UPPER DRUM ASS'Y	
4	DY4-2920-000 000	C	1	CONNECTOR 13P	
5	DY4-2727-000 000	F	8	SCREW, CROSS-RECESS	
6	DY4-2675-000 000	C	1	TERMINAL, EARTH	
7	DY4-2728-000 000	F	1	SCREW, CROSS-RECESS	
8	Y22-8120-000 000	B	1	SENSOR, DEW	
9	DY4-2910-000 000	C	1	ROLLER ASS'Y	
10	DY4-2911-000 000	C	1	LOADING MOTOR ASS'Y	
11	DY4-2726-000 000	C	1	CAPSTAN MOTOR	
12	DY4-2932-000 000	C	1	HEAD AMP ASS'Y	
13	DY4-2720-000 000	C	1	DAMPER, OIL	
14	DY4-2729-000 000	C	2	TAPE	
15	DY4-2708-000 000	C	1	SPRING, COIL	
16	DY4-2673-000 000	C	1	CASSETTE, COMPARTMENT ASS'Y	
17	DY4-2721-000 000	C	1	GUARD, GUIDE	
18	DY4-2925-000 000	C	1	HOLDER	

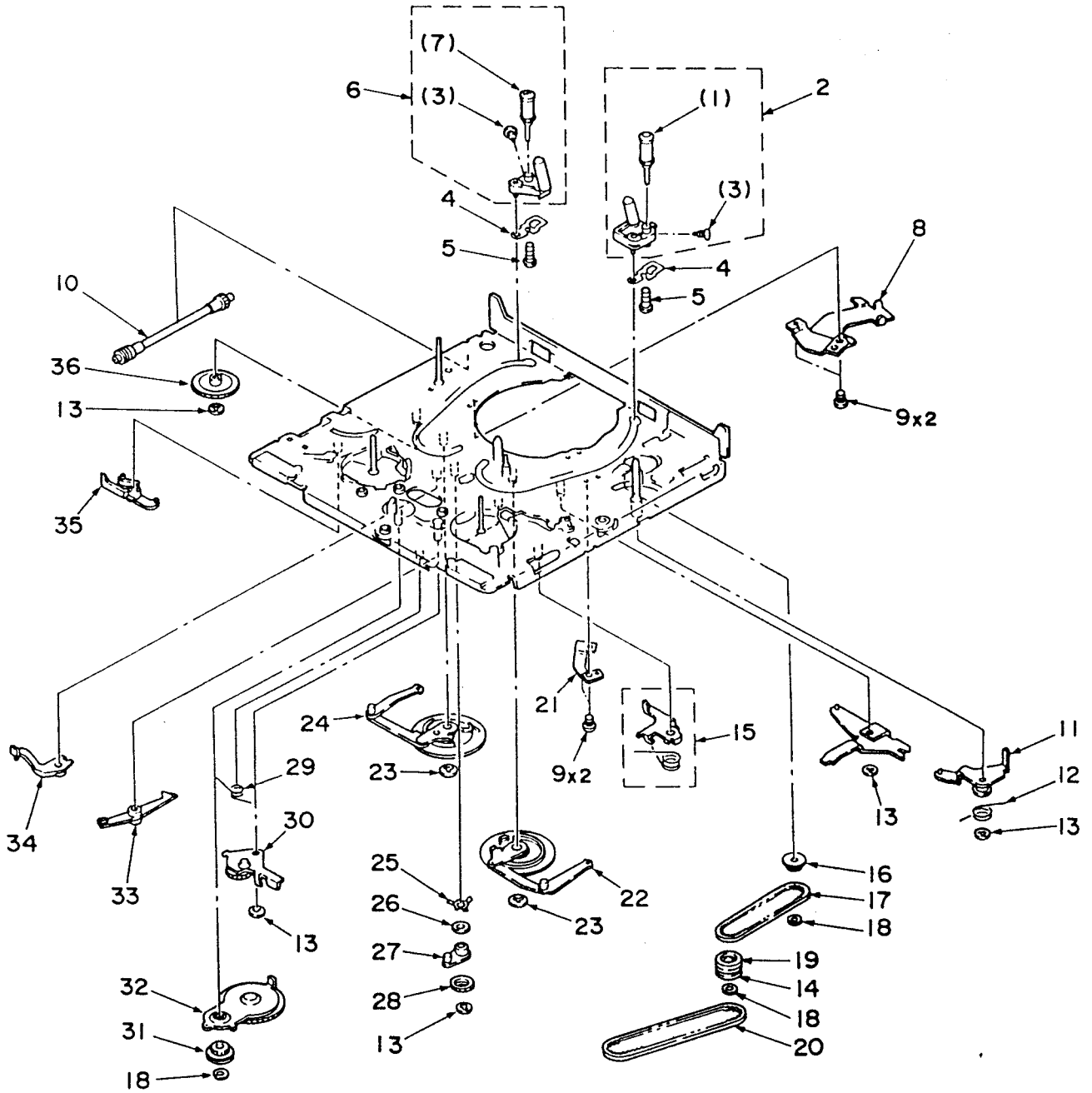
## Mechanical Chassis Section 2



## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY4-2663-000	000	C	1	REEL, SUPPLY
2	DY4-2666-000	000	C	1	REEL, TAKE UP
3	DY4-2699-000	000	C	1	SPRING, COIL
4	DY4-2696-000	000	C	4	PIN, SHAFT
5	DY4-2714-000	000	C	1	BRAKE, T
6	DY4-2692-000	000	C	1	LEVER, LB
7	DY4-2691-000	000	C	1	BRAKE, LB
8	DY4-2713-000	000	C	1	BRAKE, S
9	DY4-2710-000	000	C	1	HOLDER, LED
10	Y22-8012-000	000	B	1	LED GL452S
11	DY4-2697-000	000	C	1	SPRING, COIL
12	DY4-2716-000	000	C	1	ARM, STOPPER
13	DY4-2723-000	000	C	1	STOPPER, RK
14	DY4-2440-000	000	F	1	WASHER
15	DY4-2912-000	000	C	1	ARM, PINCH
16	DY4-2707-000	000	C	1	SPRING, PLATE
17	DY4-2664-000	000	C	1	ARM, TG7
18	DY4-2712-000	000	C	1	ARM, RELEASE
19	DY4-2680-000	000	C	1	FLEXIBLE P.C.B. (2)
20	DY4-2722-000	000	C	2	HOLDER, SENSOR
21	Y22-8123-000	000	B	2	PHOTO TRANSISTOR EE-P109
22	Y22-8121-000	000	B	2	PHOTO IC SPI-315-25-CD
23	DY4-2678-000	000	C	1	SWITCH, PUSH
24	DY4-2917-000	000	C	1	LEVER, SWITCH
25	DY4-2688-000	000	F	1	WASHER
26	DY4-2681-000	000	F	1	WASHER
27	DY4-2679-000	000	C	1	FLEXIBLE P.C.B. (1)
28	DY4-2921-000	000	C	1	SWITCH, SLIDE
29	DY4-2676-000	000	C	1	SWITCH
30	DY4-2660-000	000	C	1	BAND, TENSION
31	DY4-2727-000	000	F	1	SCREW, CROSS-RECESS
32	DY4-2725-000	000	C	1	PLATE, SWITCH
33	DY4-2728-000	000	F	2	SCREW, CROSS-RECESS
34	DY4-2690-000	000	C	1	PLATE, TL
35	DY4-2669-000	000	C	1	ARM
36	DY4-2724-000	000	C	1	SPRING, COIL
37	DY4-2717-000	000	C	1	ARM, ADJUST
38	DY4-2705-000	000	C	1	SPRING, COIL
39	DY4-2701-000	000	C	1	FLANGE, TG2
40	DY4-2704-000	000	C	1	SLEEVE, TG2
41	DY4-2702-000	000	C	1	ROLLER, TG2
42	DY4-2703-000	000	C	1	FLANGE, TG2
43	DY4-2914-000	000	C	1	STOPPER

# Mechanical Chassis Section 3

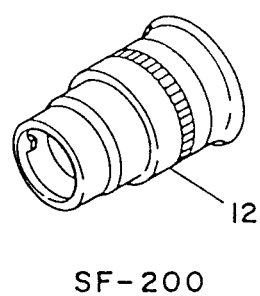
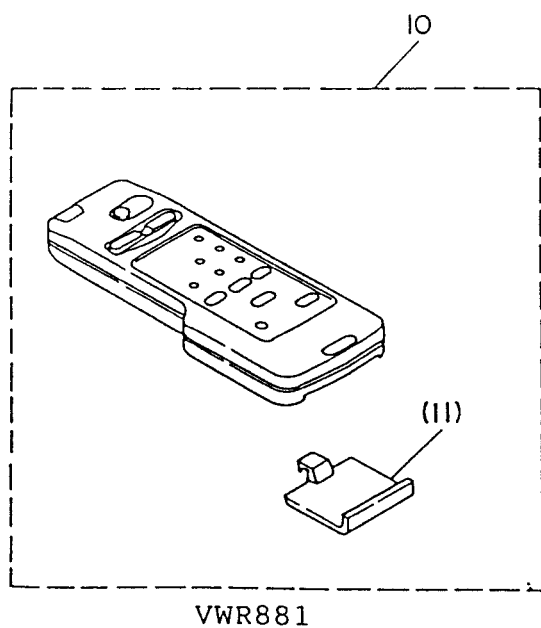
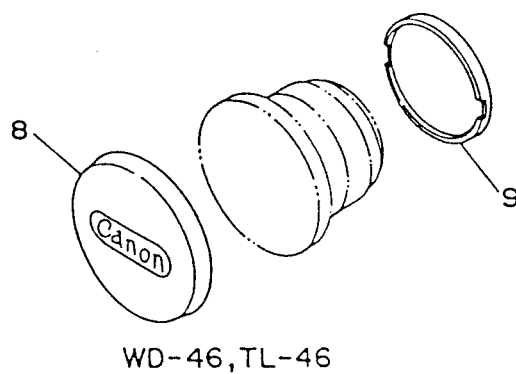
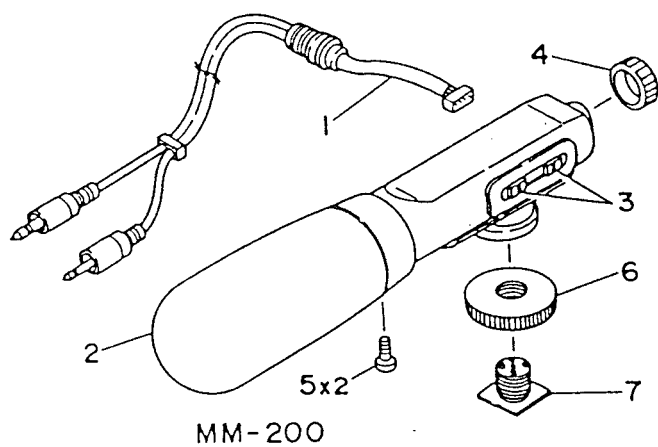




## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY4-2674-000 000	C	1	ROLLER, GUIDE	
2	DY4-2649-000 000	C	1	COASTER, RIGHT	
3	DY4-2686-000 000	F	2	SCREW, CROSS-RECESS	
4	DY4-2685-000 000	C	2	SPRING, LEAF	
5	DY4-2689-000 000	F	2	SCREW, CROSS-RECESS	
6	DY4-2648-000 000	C	1	COASTER, LEFT	
7	DY4-2662-000 000	C	1	ROLLER, GUIDE	
8	DY4-2672-000 000	C	1	PLATE, SS	
9	DY4-2728-000 000	F	4	SCREW, CROSS-RECESS	
10	DY4-2919-000 000	C	1	WORM ASS'Y	
11	DY4-2665-000 000	C	1	ARM, PINCH SUB	
12	DY4-2706-000 000	C	1	SPRING, COIL	
13	DY4-2688-000 000	F	5	WASHER	
14	DY4-2922-000 000	C	1	PULLEY, RELAY B	
15	DY4-2659-000 000	C	1	BRAKE, TS	
16	DY4-2656-000 000	C	1	GEAR, JOINT	
17	DY4-2719-000 000	E	1	BELT(S), TIMING	
18	DY4-2681-000 000	F	3	WASHER	
19	DY4-2671-000 000	C	1	PULLEY, RELAY A	
20	DY4-2923-000 000	C	1	BELT(L), TIMING	
21	DY4-2684-000 000	C	1	PLATE, TT	
22	DY4-2743-000 000	C	1	GEAR	
23	DY4-2440-000 000	F	2	WASHER	
24	DY4-2742-000 000	C	1	GEAR	
25	DY4-2700-000 000	C	1	SPRING	
26	DY4-2527-000 000	F	1	WASHER	
27	DY4-2695-000 000	C	1	ARM, UL	
28	DY4-2694-000 000	C	1	GEAR, UL	
29	DY4-2698-000 000	C	1	SPRING, COIL	
30	DY4-2650-000 000	C	1	GEAR ASS'Y	
31	DY4-2915-000 000	C	1	GEAR, RC	
32	DY4-2918-000 000	C	1	GEAR, RK	
33	DY4-2693-000 000	C	1	ARM, RELEASE	
34	DY4-2715-000 000	C	1	BRAKE, UL	
35	DY4-2711-000 000	C	1	LEVER, EJECT	
36	DY4-2924-000 000	C	1	GEAR, WHEEL	

## Accessory Parts Section



## MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DH2-1072-000 000	C	1	CORD ASS'Y	
2	DA8-0199-000 000	B	1	WIND SCREEN	
3	DA8-0195-000 000	C	2	SLIDE SWITCH	
4	DA8-0194-000 000	B	1	KNOB	
5	XB4-6201-609 000	F	2	SCREW, CROSS-RECESS	
6	CA4-4292-000 000	C	1	RING	
7	DA8-0188-000 000	C	1	SHOE	
8	DA7-1931-000 000	C	1	CAP, LENS	
9	DA7-1932-000 000	C	1	CAP, DUST	
10	DY1-5012-000 000	B	1	WIRELESS CONTROLLER VWR881	VCC858 ONLY
	DY2-1192-000 000	B	1	WIRELESS CONTROLLER WL-200	E800HiF ONLY
11	DY3-4197-000 000	B	1	COVER, BATTERY	
12	DY2-1223-000 000	B	1	SPORTS FINDER SF-200	

## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
△	C2912	VC5-9850-332 000	D 1	CAPACITOR, FILM 3300pF/100V	
△	C2915	VC5-9520-102 000	D 1	CAPACITOR, CERA. 1000pF/1KV	
△	C2917	VC6-1570-152 000	D 1	CAPACITOR, CERA. 1500pF/500V	
	CN001	VS1-1169-013 000	C 1	CONNECTOR 13P	
	CN002	VS1-5149-005 000	C 1	CONNECTOR 5P	
	CN021	VS1-0875-011 000	C 1	CONNECTOR 11P	
	CN022	VS1-5149-013 000	C 1	CONNECTOR 13P	
	CN023	VS1-5149-027 000	C 1	CONNECTOR 27P	
	CN024	VS1-5149-013 000	C 1	CONNECTOR 13P	
	CN201	VS1-5172-018 000	C 1	CONNECTOR 18P	
	CN202	VS1-0875-022 000	C 1	CONNECTOR 22P	
	CN204	VS1-5127-024 000	C 1	CONNECTOR 24P	
	CN502	VS1-5149-027 000	C 1	CONNECTOR 27P	
	CN508	VS1-1169-015 000	C 1	CONNECTOR 15P	
	CN509	VS1-5149-010 000	C 1	CONNECTOR 10P	
	CN510	VS1-1169-005 000	C 1	CONNECTOR 5P	
	CN513	VS1-5127-024 000	C 1	CONNECTOR 24P	
	CN782	VS1-5106-018 000	C 1	CONNECTOR 18P	
	CN787	DH9-0341-000 000	C 1	PIN JACK ASS'Y	
	CN2002	VS1-1020-006 000	C 1	CONNECTOR 6P	
	CN2004	VS1-5108-016 000	C 1	CONNECTOR 16P	
	CN2005	VS1-5108-012 000	C 1	CONNECTOR 12P	
	CN2201	VS1-5106-016 000	C 1	CONNECTOR 16P	
	CN2202	VS1-5106-012 000	C 1	CONNECTOR 12P	
	CN2203	VS1-5106-020 000	C 1	CONNECTOR 20P	
	CN2701	VS1-5108-018 000	C 1	CONNECTOR 18P	
	CN2702	VS1-5108-020 000	C 1	CONNECTOR 20P	
	CN2809	VS1-5106-018 000	C 1	CONNECTOR 18P	
	D001	WAL-1226-000 000	B 1	DIODE MA141WK	
	D002	WAL-1226-000 000	B 1	DIODE MA141WK	
	D003	WAL-1226-000 000	B 1	DIODE MA141WK	
	D004	WAL-1226-000 000	B 1	DIODE MA141WK	
	D005	WAL-1226-000 000	B 1	DIODE MA141WK	
	D006	WAL-1226-000 000	B 1	DIODE MA141WK	
	D007	WAL-1226-000 000	B 1	DIODE MA141WK	
	D301	WAL-0380-000 000	B 1	DIODE MA157	
	D302	WAL-0380-000 000	B 1	DIODE MA157	
	D303	WAL-1164-000 000	B 1	DIODE DAN202U	
	D304	WAL-1084-000 000	B 1	DIODE MA110	
	D305	WAL-1164-000 000	B 1	DIODE DAN202U	
	D307	WAL-1164-000 000	B 1	DIODE DAN202U	
	D501	WAL-1084-000 000	B 1	DIODE MA110	
	D502	WAL-1084-000 000	B 1	DIODE MA110	
	D503	WAL-1084-000 000	B 1	DIODE MA110	
	D505	WAL-1084-000 000	B 1	DIODE MA110	
	D506	WAL-1146-000 000	B 1	DIODE MA707	
	D507	WAL-0604-000 000	B 1	DIODE MA159	
	D508	WAL-1146-000 000	B 1	DIODE MA707	
	D514	WAL-0380-000 000	B 1	DIODE MA157	
	D517	WAL-0989-000 000	B 1	DIODE MA3100W	
	D518	WAL-1203-000 000	B 1	DIODE MA141WA	
	D519	WAL-5080-000 000	B 1	DIODE EC10QS03	
	D520	WAL-5080-000 000	B 1	DIODE EC10QS03	
	D521	WAL-1084-000 000	B 1	DIODE MA110	
	D524	WAL-1146-000 000	B 1	DIODE MA707	
	D525	WAL-1084-000 000	B 1	DIODE MA110	
	D526	WAL-0604-000 000	B 1	DIODE MA159	
	D527	WAL-1084-000 000	B 1	DIODE MA110	
	D528	WAL-0617-000 000	B 1	DIODE MA3100	
	D792	WAL-1164-000 000	B 1	DIODE DAN202U	

## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
D801	WAL-1084-000	000	B 1	DIODE MA110	
D901	WAL-1164-000	000	B 1	DIODE DAN202U	
D902	WAL-1084-000	000	B 1	DIODE MA110	
D903	WAL-1084-000	000	B 1	DIODE MA110	
D904	WAL-1084-000	000	B 1	DIODE MA110	
D905	WAL-5061-000	000	B 1	DIODE DAP202U	
D2001	WAL-1084-000	000	B 1	DIODE MA110	
D2002	WAL-5091-000	000	B 1	VARIABLE CAPACITANCE DIODE 1SV205	
D2003	WAL-1153-000	000	B 1	DIODE DA204U	
D2004	WAL-0962-000	000	B 1	DIODE MA121	
D2005	WAL-1084-000	000	B 1	DIODE MA110	
D2006	WAL-1084-000	000	B 1	DIODE MA110	
D2007	WAL-1153-000	000	B 1	DIODE DA204U	
D2101	WAL-1084-000	000	B 1	DIODE MA110	
D2102	WAL-1084-000	000	B 1	DIODE MA110	
D2103	WAL-1084-000	000	B 1	DIODE MA110	
D2201	WAL-1084-000	000	B 1	DIODE MA110	
D2202	WAL-1084-000	000	B 1	DIODE MA110	
D2203	WAL-1084-000	000	B 1	DIODE MA110	
D2401	WAL-1194-000	000	B 1	DIODE MA728	
D2402	WAL-5061-000	000	B 1	DIODE DAP202U	
D2602	WAL-5061-000	000	B 1	DIODE DAP202U	
D2801	WAL-1084-000	000	B 1	DIODE MA110	
D2803	WAL-1084-000	000	B 1	DIODE MA110	
D2901	WAL-0989-000	000	B 1	DIODE MA3100W	
D2902	WAL-1084-000	000	B 1	DIODE MA110	
D2903	WAL-1084-000	000	B 1	DIODE MA110	
D2904	WAL-1123-000	000	B 1	DIODE AG01Z	
D2905	WAL-1124-000	000	D 1	DIODE SHV02	
D2951	WAL-1084-000	000	B 1	DIODE MA110	
D2961	WAL-0384-000	000	B 1	ZENER DIODE RD5.6MB2	
FT2931	WE2-0414-000	000	C 1	FILTER, NOISE	
IC201	DH4-0263-000	000	B 1	IC CXA1207R	
IC202	DH4-0264-000	000	B 1	IC CXA1208R	
IC203	DH4-0297-000	000	B 1	IC CXL1506M	
IC204	DH4-0297-000	000	B 1	IC CXL1506M	
IC301	DH4-0205-000	000	B 1	IC LVC556F-2	
IC501	WA4-5129-000	000	B 1	IC S-87050AF	
IC502	DH4-0236-000	000	B 1	IC MM1019	
IC503	DH4-0275-000	000	B 1	IC $\mu$ PD75008GB-574	
IC504	DH4-0299-000	000	B 1	IC CXP80116-552Q	
IC505	DH4-0135-000	000	B 1	IC CXA1204Q	
IC506	DH4-0318-000	000	B 1	IC CXA1127AM	
IC507	WA4-5161-000	000	B 1	IC CXA1512M	
IC508	WA4-5127-000	000	B 1	IC CXA8006M	
IC509	DH4-0213-000	000	B 1	IC $\mu$ PD7564G-533	
IC510	DH4-0205-000	000	B 1	IC LVC556F-2	
IC783	DH4-0224-000	000	B 1	IC MM1003	
IC785	WA4-1292-000	000	B 1	IC LVA522F-2	
IC801	DH4-0190-000	000	B 1	IC CXA1237AR	
IC802	DH4-0190-000	000	B 1	IC CXA1237AR	
IC803	WA3-4150-000	000	B 1	IC BU4011BF	
IC901	WA4-0509-000	000	B 1	IC NJM2043M	
IC902	WA4-0266-000	000	B 1	IC NJM4558M	
IC903	WA4-0266-000	000	B 1	IC NJM4558M	
IC904	WA4-0363-000	000	B 1	IC NJM4556MB	
IC905	WA4-0349-000	201	B 1	IC NJM2904M	
IC908	DH4-0205-000	000	B 1	IC LVC556F-2	
IC2001	DH4-0245-000	000	B 1	IC MN5139	
IC2002	DH4-0125-000	000	B 1	IC MN53015CXY	

## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
IC2003	WA3-5362-000	000	B	1 IC MN3107CS	
IC2005	WA4-0901-000	000	B	1 IC AN2011S	
IC2006	DH4-0230-000	000	B	1 IC MN3824S	
IC2101	DH4-0300-000	000	B	1 IC M50727-192FP	
IC2201	WA4-0458-000	000	B	1 IC NJM3414M	
IC2202	DH4-0228-000	000	B	1 IC AN2154FAP	
IC2401	DH4-0229-000	000	B	1 IC AN2254FAP	
IC2402	WA3-3358-000	000	B	1 IC MC74HC4053F	
IC2601	DH4-0295-000	000	B	1 IC M37450M4-318FP	
IC2602	WA3-5392-000	000	B	1 IC S-2917IF01	
IC2603	WA3-3175-000	000	B	1 IC BU4066BF	
IC2604	WA4-1248-000	000	B	1 IC $\mu$ PC324G2	
IC2605	WA4-1248-000	000	B	1 IC $\mu$ PC324G2	
IC2606	WA4-1293-000	000	B	1 IC PST529CMT	
IC2607	WA4-1248-000	000	B	1 IC $\mu$ PC324G2	
IC2801	DH4-0281-000	000	B	1 IC LD5077	
IC2802	WA4-0349-000	201	B	1 IC NJM2904M	
IC2803	DH4-0294-000	000	B	1 IC M37450M4-319FP	
IC2804	WA3-3938-000	000	B	1 IC SC14S81F	
IC2805	WA4-5141-000	000	B	1 IC MM1036XFF	
IC2806	WA4-5141-000	000	B	1 IC MM1036XFF	
IC2807	DH4-0280-000	000	B	1 IC CM7056	
IC2808	WA3-5173-000	000	B	1 IC SC7S00FEL	
IC2901	WA4-1322-000	000	B	1 IC AN2514S	
IC2931	DH4-0205-000	000	B	1 IC LVC556F-2	
IC2941	DH4-0284-000	000	B	1 IC $\mu$ PD6145G-619	
IC2951	WA3-5122-000	000	B	1 IC SC7S32FEL	
L2902	DH9-0459-000	000	D	1 COIL 184 $\mu$ H	
LED901	WGL-0427-000	000	B	1 LED LTLD51A	
Q201	WA2-1231-000	000	B	1 TRANSISTOR IMH8	
Q202	WA2-1231-000	000	B	1 TRANSISTOR IMH8	
Q204	WA2-5131-000	000	B	1 TRANSISTOR RU201	
Q205	WA2-5051-000	000	B	1 TRANSISTOR DTA144EU	
Q207	WA2-1378-000	000	B	1 TRANSISTOR DTC144EU	
Q208	WA2-1378-000	000	B	1 TRANSISTOR DTC144EU	
Q209	WA2-1230-000	000	B	1 TRANSISTOR IMH6	
Q210	WA2-5051-000	000	B	1 TRANSISTOR DTA144EU	
Q211	WA2-1230-000	000	B	1 TRANSISTOR IMH6	
Q212	WA2-1400-000	000	B	1 TRANSISTOR 2SA1576	
Q213	WA2-1378-000	000	B	1 TRANSISTOR DTC144EU	
Q214	WA2-5168-000	000	B	1 FET 2SK879 (Y,GR)	
Q253	WA2-1232-000	000	B	1 TRANSISTOR IMZ1	
Q254	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q255	WA2-1234-000	000	B	1 TRANSISTOR IMX2	
Q257	WA2-1400-000	000	B	1 TRANSISTOR 2SA1576	
Q258	WA2-1400-000	000	B	1 TRANSISTOR 2SA1576	
Q301	WA2-1378-000	000	B	1 TRANSISTOR DTC144EU	
Q302	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q303	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q305	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q306	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q307	WA2-1400-000	000	B	1 TRANSISTOR 2SA1576	
Q308	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q309	WA2-1378-000	000	B	1 TRANSISTOR DTC144EU	
Q310	WA2-1234-000	000	B	1 TRANSISTOR IMX2	
Q311	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q312	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q313	WA2-1400-000	000	B	1 TRANSISTOR 2SA1576	
Q314	WA2-1337-000	000	B	1 TRANSISTOR 2SC4081	
Q315	WA2-1400-000	000	B	1 TRANSISTOR 2SA1576	

## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
Q316	WA2-5062-000	000	B 1	TRANSISTOR DTC144TU	
Q317	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q318	WA2-5092-000	000	B 1	TRANSISTOR IMX5	
Q321	WA2-5092-000	000	B 1	TRANSISTOR IMX5	
Q323	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q324	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q326	WA2-1416-000	000	B 1	TRANSISTOR 1MB5	
Q327	WA2-1416-000	000	B 1	TRANSISTOR 1MB5	
Q328	WA2-1198-000	000	B 1	TRANSISTOR IMD2	
Q331	WA2-1232-000	000	B 1	TRANSISTOR IMZ1	
Q332	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q333	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q334	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q336	WA2-5149-000	000	B 1	TRANSISTOR 2SB1412F5	
Q337	WA2-5152-000	000	B 1	TRANSISTOR 2SB1424	
Q338	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q340	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q342	WA2-5168-000	000	B 1	FET 2SK879 (Y,GR)	
Q343	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q344	WA2-1405-000	000	B 1	TRANSISTOR DTA124EU	
Q346	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q349	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q350	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q351	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q353	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q355	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q356	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q357	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q358	WA2-5169-000	000	B 1	FET 2SK880 (GR,BL)	
Q361	WA2-5092-000	000	B 1	TRANSISTOR IMX5	
Q363	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q365	WA2-5105-000	000	B 1	TRANSISTOR DTA144TU	
Q368	WA2-1198-000	000	B 1	TRANSISTOR IMD2	
Q369	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q371	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q372	WA2-1230-000	000	B 1	TRANSISTOR IMH6	
Q373	WA2-1230-000	000	B 1	TRANSISTOR IMH6	
Q375	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q376	WA2-5169-000	000	B 1	FET 2SK880 (GR,BL)	
Q377	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q378	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q399	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q501	WA2-1099-000	000	B 1	TRANSISTOR FMW1	
Q502	WA2-1099-000	000	B 1	TRANSISTOR FMW1	
Q503	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q504	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q506	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q507	WA2-1231-000	000	B 1	TRANSISTOR IMH8	
Q508	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q509	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q510	WA2-1377-000	000	B 1	TRANSISTOR DTC143EU	
Q511	WA2-1407-000	000	B 1	TRANSISTOR DTC114TU	
Q512	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q513	WA2-5088-000	000	B 1	TRANSISTOR DTC114EU	
Q514	WA2-1230-000	000	B 1	TRANSISTOR IMH6	
Q515	WA2-5152-000	000	B 1	TRANSISTOR 2SB1424	
Q516	WA2-5152-000	000	B 1	TRANSISTOR 2SB1424	
Q517	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q518	WA2-1231-000	000	B 1	TRANSISTOR IMH8	
Q519	WA2-1231-000	000	B 1	TRANSISTOR IMH8	

## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
Q520	WA2-5152-000	000	B 1	TRANSISTOR 2SB1424	
Q521	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q522	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q523	WA2-5152-000	000	B 1	TRANSISTOR 2SB1424	
Q524	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q525	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q527	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q528	WA2-1232-000	000	B 1	TRANSISTOR IMZ1	
Q529	WA2-1231-000	000	B 1	TRANSISTOR IMH8	
Q530	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q531	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q532	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q533	WA2-5148-000	000	B 1	TRANSISTOR DTA144WU	
Q552	WA2-5062-000	000	B 1	TRANSISTOR DTC144TU	
Q553	WA2-1231-000	000	B 1	TRANSISTOR IMH8	
Q554	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q555	WA2-5122-000	000	B 1	TRANSISTOR FC101	
Q561	WA2-1405-000	000	B 1	TRANSISTOR DTA124EU	
Q562	WA2-1377-000	000	B 1	TRANSISTOR DTC143EU	
Q781	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q801	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q802	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q804	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q806	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q807	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q808	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU	
Q901	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q902	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q903	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q904	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q905	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q906	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q907	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q908	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q909	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q910	WA2-0646-000	000	B 1	TRANSISTOR 2SD1328	
Q950	WA2-1437-000	000	B 1	TRANSISTOR 2SB1121(S,T)	
Q951	WA2-1416-000	000	B 1	TRANSISTOR IMB5	
Q952	WA2-5062-000	000	B 1	TRANSISTOR DTC144TU	
Q953	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q954	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q955	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q2001	WA2-1501-000	000	B 1	FET 2SK198	
Q2002	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q2003	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q2004	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q2005	WA2-1172-000	000	B 1	TRANSISTOR 2SA1461	
Q2006	WA2-0052-000	000	B 1	TRANSISTOR 2SC1621	
Q2007	WA2-1172-000	000	B 1	TRANSISTOR 2SA1461	
Q2008	WA2-0052-000	000	B 1	TRANSISTOR 2SC1621	
Q2009	WA2-1172-000	000	B 1	TRANSISTOR 2SA1461	
Q2010	WA2-0052-000	000	B 1	TRANSISTOR 2SC1621	
Q2011	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081	
Q2012	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q2101	WA2-1231-000	000	B 1	TRANSISTOR IMH8	
Q2102	WA2-5051-000	000	B 1	TRANSISTOR DTA144EU	
Q2201	WA2-1256-000	000	B 1	TRANSISTOR IMH5	
Q2202	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576	
Q2205	WA2-1234-000	000	B 1	TRANSISTOR IMX2	
Q2206	WA2-1232-000	000	B 1	TRANSISTOR IMZ1	



## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	Q2207	WA2-1232-000	000	B 1	TRANSISTOR IMZ1
	Q2208	WA2-1228-000	000	B 1	TRANSISTOR IMT2
	Q2209	WA2-1256-000	000	B 1	TRANSISTOR IMH5
	Q2210	WA2-1232-000	000	B 1	TRANSISTOR IMZ1
	Q2211	WA2-1232-000	000	B 1	TRANSISTOR IMZ1
	Q2212	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2213	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2214	WA2-1232-000	000	B 1	TRANSISTOR IMZ1
	Q2215	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU
	Q2216	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2217	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2218	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2401	WA2-1351-000	000	B 1	TRANSISTOR IMD6
	Q2402	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2403	WA2-1232-000	000	B 1	TRANSISTOR IMZ1
	Q2405	WA2-1228-000	000	B 1	TRANSISTOR IMT2
	Q2409	WA2-1297-000	000	B 1	TRANSISTOR IMB7
	Q2410	WA2-1228-000	000	B 1	TRANSISTOR IMT2
	Q2411	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU
	Q2412	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2413	WA2-1228-000	000	B 1	TRANSISTOR IMT2
	Q2414	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2415	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2416	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2417	WA2-1228-000	000	B 1	TRANSISTOR IMT2
	Q2418	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2419	WA2-1351-000	000	B 1	TRANSISTOR IMD6
	Q2420	WA2-1400-000	000	B 1	TRANSISTOR 2SA1576
	Q2421	WA2-1228-000	000	B 1	TRANSISTOR IMT2
	Q2422	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081
	Q2601	WA2-1256-000	000	B 1	TRANSISTOR IMH5
	Q2602	WA2-1232-000	000	B 1	TRANSISTOR IMZ1
	Q2603	WA2-1256-000	000	B 1	TRANSISTOR IMH5
	Q2801	WA2-1234-000	000	B 1	TRANSISTOR IMX2
	Q2802	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081
	Q2803	WA2-1378-000	000	B 1	TRANSISTOR DTC144EU
	Q2804	WA2-1337-000	000	B 1	TRANSISTOR 2SC4081
	Q2806	WA2-1198-000	000	B 1	TRANSISTOR IMD2
	Q2901	WA2-0839-000	000	B 1	TRANSISTOR 2SA1226
	Q2902	WA2-1498-000	000	B 1	TRANSISTOR 2SA1162
△	Q2903	WA2-0393-000	201	B 1	TRANSISTOR 2SA1162
	Q2904	WA2-5151-000	000	D 1	TRANSISTOR 2SD968A-S
	Q2931	WA2-0797-000	201	B 1	TRANSISTOR 2SA1213
	Q2951	WA2-0393-000	201	B 1	TRANSISTOR 2SA1162
	Q2952	WA2-0735-000	201	B 1	TRANSISTOR 2SC2712
	Q2953	WA2-0735-000	201	B 1	TRANSISTOR 2SC2712
	Q2961	WA2-1237-000	000	B 1	TRANSISTOR DTA144TK
△	RR301	DH4-0143-000	000	D 1	LINK, IC ICP-F20
△	RR501	DH4-0144-000	000	D 1	LINK, IC ICP-F25
△	RR2931	DH4-0142-000	000	D 1	LINK, IC ICP-F15
△	RR2932	DH4-0142-000	000	D 1	LINK, IC ICP-F15
△	RR2933	DH4-0142-000	000	D 1	LINK, IC ICP-F15
△	RR2934	DH4-0166-000	000	D 1	LINK, IC D2000
△	T2901	DH9-0456-000	000	D 1	FLYBACK TRANSFORMER
	TH2901	WA8-0195-000	000	C 1	THERMISTER
	VC2001	VC6-0340-100	000	C 1	CAPACITOR, TRIMMER 10pF
	VC2002	VC6-0340-200	000	C 1	CAPACITOR, TRIMMER 20pF
	VC2401	VC6-0340-300	000	C 1	CAPACITOR, TRIMMER 30pF
	VC2701	VC6-0340-300	000	C 1	CAPACITOR, TRIMMER 30pF
	VC2801	VC6-0340-300	000	C 1	CAPACITOR, TRIMMER 30pF

## ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
VC2941	VC5-9700-300 000	C	1	CAPACITOR, TRIMMER 30pF	
VR201	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR202	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
VR203	VR5-7780-473 000	C	1	RESISTOR, VARIABLE 47KΩ	
VR204	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR206	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR207	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR208	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR210	VR5-7780-102 000	C	1	RESISTOR, VARIABLE 1KΩ	
VR211	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR302	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR303	VR5-7780-104 000	C	1	RESISTOR, VARIABLE 100KΩ	
VR304	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR305	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR306	VR5-7780-102 000	C	1	RESISTOR, VARIABLE 1KΩ	
VR308	VR5-7780-471 000	C	1	RESISTOR, VARIABLE 470Ω	
VR309	VR5-7780-101 000	C	1	RESISTOR, VARIABLE 100Ω	
VR501	VR7-0670-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR503	VR7-0670-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR504	VR7-0670-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR803	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR804	VR5-7780-223 000	C	1	RESISTOR, VARIABLE 22KΩ	
VR805	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR806	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR807	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR808	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR2001	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2201	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR2202	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2203	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2204	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2205	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR2401	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2402	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2403	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR2801	VR5-7780-103 000	C	1	RESISTOR, VARIABLE 10KΩ	
VR2802	VR5-7780-472 000	C	1	RESISTOR, VARIABLE 4.7KΩ	
VR2803	VR5-7780-104 000	C	1	RESISTOR, VARIABLE 100KΩ	
VR2901	VR5-7680-201 000	C	1	RESISTOR, VARIABLE 200Ω	
VR2902	VR5-7680-503 000	C	1	RESISTOR, VARIABLE 50KΩ	
△ VR2903	VR5-4640-205 000	D	1	RESISTOR, VARIABLE 2MΩ	
△ VR2904	VR5-4640-504 000	C	1	RESISTOR, VARIABLE 500KΩ	
VR2961	VR5-7680-503 000	C	1	RESISTOR, VARIABLE 50KΩ	

## PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
14	CA4-4292-000 000	C	1	RING	
2	DA1-1702-000 000	B	1	HOOD	
2	DA1-2517-000 000	B	1	KNOB, BATTERY EJECT	VCC858 ONLY
2	DA1-1864-000 000	B	1	RING, RUBBER	
6	DA1-1900-000 000	F	4	SCREW, CROSS-RECESS	
2	DA1-1948-000 000	F	1	SCREW, CROSS-RECESS	
6	DA1-2349-000 000	C	1	PLATE, GROUND	
2	DA1-2514-000 000	B	2	SEAL	VCC858 ONLY
2	DA1-2460-000 000	B	1	KNOB, T/W	
2	DA1-2461-000 000	C	1	PLATE, GRIP (1)	
2	DA1-2463-000 000	C	2	TERMINAL, BATTERY	
2	DA1-2486-000 000	B	1	SHOE, ACCESSORY	
2	DA1-2489-000 000	B	1	SHEET, ACCESSORY SHOE	
2	DA1-2457-000 000	B	1	RING, E.V.F.	VCC858 ONLY
2	DA1-4132-000 000	B	1	STRAP, HAND	VCC858 ONLY
4	DA1-3601-000 000	C	1	HOLDER, CAMERA (1)	
4	DA1-3602-000 000	C	1	HOLDER, CAMERA (2)	
4	DA1-3610-000 000	F	1	PLATE, TRIPOD	
6	DA1-3617-000 000	C	1	HOLDER (2), RECORDER	
2	DA1-4734-000 000	B	1	COVER, LENS	VCC858 ONLY
2	DA1-4736-000 000	B	1	COVER, BATTERY	VCC858 ONLY
2	DA1-4726-000 000	B	1	CAP, AV	VCC858 ONLY
2	DA1-4727-000 000	B	1	KNOB, GRIP	VCC858 ONLY
2	DA1-3659-000 000	C	1	PLATE, GRIP (2)	
4	DA7-1458-000 000	C	1	DUMPER, RUBBER	
4	DA7-1724-000 000	C	1	STOPPER, NEARDISTANCE	
4	DA7-1734-000 000	C	1	STOPPER, RUBBER	
4	DA7-1739-000 000	C	1	COVER, IG METER	
4	DA7-1792-000 000	C	1	BLING, IG METER (B)	
14	DA7-1931-000 000	C	1	CAP, LENS	
14	DA7-1932-000 000	C	1	CAP, DUST	
14	DA8-0188-000 000	C	1	SHOE	
14	DA8-0194-000 000	B	1	KNOB	
14	DA8-0195-000 000	C	2	SLIDE SWITCH	
14	DA8-0199-000 000	B	1	WIND SCREEN	
2	DF1-0865-000 000	B	1	CAP, LENS	VCC858 ONLY
2	DF1-1020-000 000	B	1	RIGHT COVER ASS'Y	VCC858 ONLY
2	DF1-0749-000 000	B	1	RIGHT COVER ASS'Y	E800HiF ONLY
4	DF1-0754-000 000	C	1	LITHIUM ASS'Y	
2	DF1-1021-000 000	B	1	COVER, CASSETTE	VCC858 ONLY
6	DF1-0756-000 000	C	1	PRINTED CORD ASS'Y	
6	DF1-0757-000 000	C	1	PRINTED CORD ASS'Y	
6	DF1-0759-000 000	C	1	HOLDER (1), RECORDER	
6	DG1-1228-000 000	C	1	RECORDER KEY C.B.A.	
2	DG1-1230-000 000	C	1	MIC. JACK C.B.A.	
2	DG1-1236-000 000	C	1	REMOCON C.B.A.	
6	DG1-1248-000 000	C	1	POWER EJECT C.B.A.	
4	DG1-1249-000 000	C	1	SENSOR C.B.A.	
4	DG1-1250-000 000	C	1	PROCESS C.B.A.	
6	DG1-1252-000 000	C	1	CJ C.B.A.	
6	DG1-1257-000 000	C	1	SYSCON SERVO C.B.A.	
6	DG1-1258-000 000	C	1	AUDIO VIDEO C.B.A.	
2	DG1-1260-000 000	C	1	GRIP C.B.A.	
4	DG1-1261-000 000	C	1	DIGITAL MEMORY C.B.A.	
4	DG1-1262-000 000	C	1	CAMERA KEY C.B.A	E800HiE ONLY
4	DG1-1263-000 000	C	1	CAMERA KEY C.B.A.	E800HiF ONLY
2	DG1-1362-000 000	B	1	LEFT COVER, GRIP	VCC858 ONLY
4	DG9-3384-000 000	C	1	RELAY LENS ASS'Y	
14	DH2-1072-000 000	C	1	CORD ASS'Y	
6	DH2-1229-000 000	C	1	PRINTED CORD	

## PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
6	DH2-1230-000	000	C	1	PRINTED CORD
6	DH2-1241-000	000	C	1	PRINTED CORD
6	DH2-1242-000	000	C	1	PRINTED CORD
6	DH2-1244-000	000	C	1	PRINTED CORD
6	DH2-1250-000	000	C	1	CONNECTOR 11P
4	DH3-0018-000	000	C	1	DC/DC CONVERTER
	DH4-0125-000	000	B	1	IC MN53015CXY
	DH4-0135-000	000	B	1	IC CXA1204Q
	DH4-0142-000	000	D	3	LINK, IC ICP-F15
	DH4-0143-000	000	D	1	LINK, IC ICP-F20
	DH4-0144-000	000	D	1	LINK, IC ICP-F25
	DH4-0166-000	000	D	1	LINK, IC D2000
	DH4-0190-000	000	B	2	IC CXA1237AR
	DH4-0205-000	000	B	4	IC LVC556F-2
	DH4-0213-000	000	B	1	IC $\mu$ PD7564G-533
	DH4-0224-000	000	B	1	IC MM1003
	DH4-0228-000	000	B	1	IC AN2154FAP
	DH4-0229-000	000	B	1	IC AN2254FAP
	DH4-0230-000	000	D	1	IC MN3824S
	DH4-0236-000	000	B	1	IC MM1019
4	DH4-0242-000	000	B	1	CCD MN3761FSZ
	DH4-0245-000	000	B	1	IC MN5139
	DH4-0263-000	000	B	1	IC CXA1207R
	DH4-0264-000	000	B	1	IC CXA1208R
	DH4-0275-000	000	B	1	IC $\mu$ PD75008GB-574
	DH4-0280-000	000	B	1	IC CM7056
	DH4-0281-000	000	B	1	IC LD5077
	DH4-0284-000	000	B	1	IC $\mu$ PD6145G-619
	DH4-0294-000	000	B	1	IC M37450M4-319FP
	DH4-0295-000	000	B	1	IC M37450M4-318FP
	DH4-0297-000	000	B	2	IC CXL1506M
	DH4-0299-000	000	B	1	IC CXP80116-552Q
	DH4-0300-000	000	B	1	IC M50727-192FP
6	DH4-0301-000	000	C	1	JOG C.B.A.
	DH4-0318-000	000	B	1	IC CXA1127AM
	DH9-0341-000	000	C	1	PIN JACK ASS'Y
	DH9-0456-000	000	D	1	FLYBACK TRANSFORMER
	DH9-0459-000	000	D	1	COIL 184 $\mu$ H
2	DH9-0543-000	000	B	1	MICROPHONE ASS'Y
2	DS1-5186-000	000	C	1	SPRING
4	DS1-5198-000	000	C	1	SPRING, COIL
4	DY1-7128-000	000	C	1	ZOOM LENS ASS'Y
4	DY1-7129-000	000	C	1	FOCUS LENS ASS'Y
4	DY1-7130-000	000	C	1	ZOOM RING ASS'Y
2	DY2-1159-000	000	D	1	CRT ASS'Y
14	DY1-5012-000	000	B	1	WIRELESS CONTROLLER VWR881
14	DY2-1192-000	000	B	1	WIRELESS CONTROLLER WL-200
14	DY2-1223-000	000	B	1	SPORTS FINDER SF-200
2	DY1-5011-000	000	B	1	LEFT COVER ASS'Y
2	DY2-1219-000	000	B	1	RIGHT COVER, GRIP
2	DY1-5009-000	000	B	1	TOP COVER ASS'Y
2	DY2-1277-000	000	B	1	TOP COVER ASS'Y
2	DY1-5010-000	000	B	1	COVER, REAR
2	DY2-1279-000	000	B	1	COVER, REAR
14	DY3-4197-000	000	B	1	COVER, BATTERY
2	DY3-4203-000	000	B	1	TOP COVER, MIC
2	DY3-4204-000	000	B	1	BOTTOM COVER, MIC
10,12	DY4-2440-000	000	F	3	WASHER
12	DY4-2527-000	000	F	1	WASHER
12	DY4-2648-000	000	C	1	COASTER, LEFT

## PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
12	DY4-2649-000	000	C	1	COASTER, RIGHT
12	DY4-2650-000	000	C	1	GEAR ASS'Y
12	DY4-2656-000	000	C	1	GEAR, JOINT
12	DY4-2659-000	000	C	1	BRAKE, TS
10	DY4-2660-000	000	C	1	BAND, TENSION
12	DY4-2662-000	000	C	1	ROLLER, GUIDE
10	DY4-2663-000	000	C	1	REEL, SUPPLY
10	DY4-2664-000	000	C	1	ARM, TG7
12	DY4-2665-000	000	C	1	ARM, PINCH SUB
10	DY4-2666-000	000	C	1	REEL, TAKE UP
10	DY4-2669-000	000	C	1	ARM
12	DY4-2671-000	000	C	1	PULLEY, RELAY A
12	DY4-2672-000	000	C	1	PLATE, SS
8	DY4-2673-000	000	C	1	CASSETTE COMPARTMENT ASS'Y
12	DY4-2674-000	000	C	1	ROLLER, GUIDE
8	DY4-2675-000	000	C	1	TERMINAL, EARTH
10	DY4-2676-000	000	C	1	SWITCH
10	DY4-2678-000	000	C	1	SWITCH, PUSH
10	DY4-2679-000	000	C	1	FLEXIBLE P.C.B. (1)
10	DY4-2680-000	000	C	1	FLEXIBLE P.C.B. (2)
10,12	DY4-2681-000	000	F	4	WASHER
12	DY4-2684-000	000	C	1	PLATE, TT
12	DY4-2685-000	000	C	2	SPRING, LEAF
12	DY4-2686-000	000	F	2	SCREW, CROSS-RECESS
10,12	DY4-2688-000	000	F	6	WASHER
12	DY4-2689-000	000	F	2	SCREW, CROSS-RECESS
10	DY4-2690-000	000	C	1	PLATE, TL
10	DY4-2691-000	000	C	1	BRAKE, LB
10	DY4-2692-000	000	C	1	LEVER, LB
12	DY4-2693-000	000	C	1	ARM, RELEASE
12	DY4-2694-000	000	C	1	GEAR, UL
12	DY4-2695-000	000	C	1	ARM, UL
10	DY4-2696-000	000	C	4	PIN, SHAFT
10	DY4-2697-000	000	C	1	SPRING, COIL
12	DY4-2698-000	000	C	1	SPRING, COIL
10	DY4-2699-000	000	C	1	SPRING, COIL
12	DY4-2700-000	000	C	1	SPRING
10	DY4-2701-000	000	C	1	FLANGE, TG2
10	DY4-2702-000	000	C	1	ROLLER, TG2
10	DY4-2703-000	000	C	1	FLANGE, TG2
10	DY4-2704-000	000	C	1	SLEEVE, TG2
10	DY4-2705-000	000	C	1	SPRING, COIL
12	DY4-2706-000	000	C	1	SPRING, COIL
10	DY4-2707-000	000	C	1	SPRING, PLATE
8	DY4-2708-000	000	C	1	SPRING, COIL
10	DY4-2710-000	000	C	1	HOLDER, LED
12	DY4-2711-000	000	C	1	LEVER, EJECT
10	DY4-2712-000	000	C	1	ARM, RELEASE
10	DY4-2713-000	000	C	1	BRAKE, S
10	DY4-2714-000	000	C	1	BRAKE, T
12	DY4-2715-000	000	C	1	BRAKE, UL
10	DY4-2716-000	000	C	1	ARM, STOPPER
10	DY4-2717-000	000	C	1	ARM, ADJUST
12	DY4-2719-000	000	E	1	BELT(S), TIMING
8	DY4-2720-000	000	C	1	DAMPER, OIL
8	DY4-2721-000	000	C	1	GUARD, GUIDE
10	DY4-2722-000	000	C	2	HOLDER, SENSOR
10	DY4-2723-000	000	C	1	STOPPER, RK
10	DY4-2724-000	000	C	1	SPRING, COIL
10	DY4-2725-000	000	C	1	PLATE, SWITCH

## PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
8	DY4-2726-000	000	C	1	CAPSTAN MOTOR
8,10	DY4-2727-000	000	F	9	SCREW, CROSS-RECESS
8,10,12	DY4-2728-000	000	F	7	SCREW, CROSS-RECESS
8	DY4-2729-000	000	C	2	TAPE
8	DY4-2730-000	000	F	5	SCREW, CROSS-RECESS
12	DY4-2742-000	000	C	1	GEAR
12	DY4-2743-000	000	C	1	GEAR
8	DY4-2910-000	000	C	1	ROLLER ASS'Y
8	DY4-2911-000	000	C	1	LOADING MOTOR ASS'Y
10	DY4-2912-000	000	C	1	ARM, PINCH
10	DY4-2914-000	000	C	1	STOPPER
12	DY4-2915-000	000	C	1	GEAR, RC
10	DY4-2917-000	000	C	1	LEVER, SWITCH
12	DY4-2918-000	000	C	1	GEAR, RK
12	DY4-2919-000	000	C	1	WORM ASS'Y
8	DY4-2920-000	000	C	1	CONNECTOR 13P
10	DY4-2921-000	000	C	1	SWITCH, SLIDE
12	DY4-2922-000	000	C	1	PULLY, RELAY B
12	DY4-2923-000	000	C	1	BELT(L), TIMING
12	DY4-2924-000	000	C	1	GEAR, WHEEL
8	DY4-2925-000	000	C	1	HOLDER
8	DY4-2930-000	000	E	1	DRUM ASS'Y
8	DY4-2931-000	000	E	1	UPPER DRUM ASS'Y
8	DY4-2932-000	000	C	1	HEAD AMP ASS'Y
⚠	VC5-9520-102	000	D	1	CAPACITOR, CERA. 1000pF/1KV
	VC5-9700-300	000	C	1	CAPACITOR, TRIMMER 30pF
⚠	VC5-9850-332	000	D	1	CAPACITOR, FILM 3300pF/100V
	VC6-0340-100	000	C	1	CAPACITOR, TRIMMER 10pF
	VC6-0340-200	000	C	1	CAPACITOR, TRIMMER 20pF
	VC6-0340-300	000	C	3	CAPACITOR, TRIMMER 30pF
⚠	VC6-1570-152	000	D	1	CAPACITOR, CERA. 1500pF/500V
⚠	VR5-4640-205	000	D	1	RESISTOR, VARIABLE 2MΩ
	VR5-4640-504	000	C	1	RESISTOR, VARIABLE 500KΩ
	VR5-7680-201	000	C	1	RESISTOR, VARIABLE 200Ω
	VR5-7680-503	000	C	2	RESISTOR, VARIABLE 50KΩ
	VR5-7780-101	000	C	1	RESISTOR, VARIABLE 100Ω
	VR5-7780-102	000	C	2	RESISTOR, VARIABLE 1KΩ
	VR5-7780-103	000	C	9	RESISTOR, VARIABLE 10KΩ
	VR5-7780-104	000	C	2	RESISTOR, VARIABLE 100KΩ
	VR5-7780-223	000	C	5	RESISTOR, VARIABLE 22KΩ
	VR5-7780-471	000	C	1	RESISTOR, VARIABLE 470Ω
	VR5-7780-472	000	C	12	RESISTOR, VARIABLE 4.7KΩ
	VR5-7780-473	000	C	2	RESISTOR, VARIABLE 47KΩ
	VR7-0670-103	000	C	2	RESISTOR, VARIABLE 10KΩ
	VR7-0670-223	000	C	1	RESISTOR, VARIABLE 22KΩ
	VS1-0875-011	000	C	1	CONNECTOR 11P
	VS1-0875-022	000	C	1	CONNECTOR 22P
	VS1-1020-006	000	C	1	CONNECTOR 6P
	VS1-1169-005	000	C	1	CONNECTOR 5P
	VS1-1169-013	000	C	1	CONNECTOR 13P
	VS1-1169-015	000	C	1	CONNECTOR 15P
	VS1-5106-012	000	C	1	CONNECTOR 12P
	VS1-5106-016	000	C	1	CONNECTOR 16P
	VS1-5106-018	000	C	2	CONNECTOR 18P
	VS1-5106-020	000	C	1	CONNECTOR 20P
	VS1-5108-012	000	C	1	CONNECTOR 12P
	VS1-5108-016	000	C	1	CONNECTOR 16P
	VS1-5108-018	000	C	1	CONNECTOR 18P
	VS1-5108-020	000	C	1	CONNECTOR 20P
	VS1-5127-024	000	C	2	CONNECTOR 24P

## PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	VS1-5149-005	000	C 1	CONNECTOR 5P	
	VS1-5149-010	000	C 1	CONNECTOR 10P	
	VS1-5149-013	000	C 2	CONNECTOR 13P	
	VS1-5149-027	000	C 2	CONNECTOR 27P	
	VS1-5172-018	000	C 1	CONNECTOR 18P	
	WAl-0380-000	000	B 3	DIODE MA157	
	WAl-0384-000	000	B 1	ZENER DIODE RD5.6MB2	
	WAl-0604-000	000	B 2	DIODE MA159	
	WAl-0617-000	000	B 1	DIODE MA3100	
	WAl-0962-000	000	B 1	DIODE MA121	
	WAl-0989-000	000	B 2	DIODE MA3100W	
	WAl-1084-000	000	B 26	DIODE MA110	
	WAl-1123-000	000	B 1	DIODE AG01Z	
	WAl-1124-000	000	D 1	DIODE SHV02	
	WAl-1146-000	000	B 3	DIODE MA707	
	WAl-1153-000	000	B 2	DIODE DA204U	
	WAl-1164-000	000	B 5	DIODE DAN202U	
	WAl-1194-000	000	B 1	DIODE MA728	
	WAl-1203-000	000	B 1	DIODE MA141WA	
	WAl-1226-000	000	B 7	DIODE MA141WK	
	WAl-5061-000	000	B 3	DIODE DAP202U	
	WAl-5080-000	000	B 2	DIODE EC10QS03	
	WAl-5091-000	000	B 1	VARIABLE CAPACITANCE DIODE 1SV205	
	WA2-0052-000	000	B 3	TRANSISTOR 2SC1621	
	WA2-0393-000	201	B 2	TRANSISTOR 2SA1162	
	WA2-0646-000	000	B 9	TRANSISTOR 2SD1328	
	WA2-0735-000	201	B 2	TRANSISTOR 2SC2712	
	WA2-0797-000	201	B 1	TRANSISTOR 2SA1213	
	WA2-0839-000	000	B 1	TRANSISTOR 2SA1226	
	WA2-1099-000	000	B 2	TRANSISTOR FMW1	
	WA2-1172-000	000	B 3	TRANSISTOR 2SA1461	
	WA2-1198-000	000	B 3	TRANSISTOR IMD2	
	WA2-1228-000	000	B 6	TRANSISTOR IMT2	
	WA2-1230-000	000	B 5	TRANSISTOR IMH6	
	WA2-1231-000	000	B 8	TRANSISTOR IMH8	
	WA2-1232-000	000	B 10	TRANSISTOR IMZ1	
	WA2-1234-000	000	B 23	TRANSISTOR IMX2	
	WA2-1237-000	000	B 1	TRANSISTOR DTA144TK	
	WA2-1256-000	000	B 4	TRANSISTOR IMH5	
	WA2-1297-000	000	B 1	TRANSISTOR IMB7	
	WA2-1337-000	000	B 28	TRANSISTOR 2SC4081	
	WA2-1351-000	000	B 2	TRANSISTOR IMD6	
	WA2-1377-000	000	B 2	TRANSISTOR DTC143EU	
	WA2-1378-000	000	B 26	TRANSISTOR DTC144EU	
	WA2-1400-000	000	B 14	TRANSISTOR 2SA1576	
	WA2-1405-000	000	B 2	TRANSISTOR DTA124EU	
	WA2-1407-000	000	B 1	TRANSISTOR DTC114TU	
	WA2-1416-000	000	B 3	TRANSISTOR 1MB5	
	WA2-1437-000	000	B 1	TRANSISTOR 2SB1121(S,T)	
	WA2-1498-000	000	B 1	TRANSISTOR 2SA1162	
	WA2-1501-000	000	B 1	FET 2SKS198	
	WA2-5051-000	000	B 11	TRANSISTOR DTA144EU	
	WA2-5062-000	000	B 3	TRANSISTOR DTC144TU	
	WA2-5088-000	000	B 1	TRANSISTOR DTC114EU	
	WA2-5092-000	000	B 3	TRANSISTOR IMX5	
	WA2-5105-000	000	B 1	TRANSISTOR DTA144TU	
	WA2-5122-000	000	B 1	TRANSISTOR FC101	
	WA2-5131-000	000	B 1	TRANSISTOR RU201	
	WA2-5148-000	000	B 1	TRANSISTOR DTA144WU	
	WA2-5149-000	000	B 1	TRANSISTOR 2SB1412F5	

## PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
△	WA2-5151-000 000	D	1	TRANSISTOR 2SD968A-S	
	WA2-5152-000 000	B	5	TRANSISTOR 2SB1424	
	WA2-5168-000 000	B	2	FET 2SK879 (Y,GR)	
	WA2-5169-000 000	B	2	FET 2SK880 (GR,BL)	
	WA3-3175-000 000	B	1	IC BU4066BF	
	WA3-3358-000 000	B	1	IC MC74HC4053F	
	WA3-3938-000 000	B	1	IC SC14S81F	
	WA3-4150-000 000	B	1	IC BU4011BF	
	WA3-5122-000 000	B	1	IC SC7S32FEL	
	WA3-5173-000 000	B	1	IC SC7S00FEL	
	WA3-5362-000 000	B	1	IC MN3107CS	
	WA3-5392-000 000	B	1	IC S-29171F01	
	WA4-0266-000 000	B	2	IC NJM4558M	
	WA4-0349-000 201	B	2	IC NJM2904M	
	WA4-0363-000 000	B	1	IC NJM4556MB	
	WA4-0458-000 000	B	1	IC NJM3414M	
	WA4-0509-000 000	B	1	IC NJM2043M	
	WA4-0901-000 000	B	1	IC AN2011S	
	WA4-1248-000 000	B	3	IC $\mu$ PC324G2	
	WA4-1292-000 000	B	1	IC LVA522F-2	
	WA4-1293-000 000	B	1	IC PST529CMT	
	WA4-1322-000 000	B	1	IC AN2514S	
	WA4-5127-000 000	B	1	IC CXA8006M	
	WA4-5129-000 000	B	1	IC S-87050AF	
	WA4-5141-000 000	B	1	IC MM1036XFF	
	WA4-5161-000 000	B	1	IC CXA1512M	
	WA8-0195-000 000	C	1	THERMISTER	
	WE2-0414-000 000	C	1	FILTER, NOISE	
	WG1-0427-000 000	B	1	LED LT1D51A	
2	XA1-6200-409 000	F	2	SCREW, CROSS-RECESS, PH	
2,4,6	XA1-7200-307 000	F	14	SCREW, CROSS-RECESS, PH	
4	XA4-2170-707 000	F	1	SCREW, CROSS-RECESS	
4	XA4-4170-407 000	F	1	SCREW, CROSS-RECESS, PH	
4	XA4-4170-457 000	F	1	SCREW, CROSS-RECESS, PH	
4	XA4-4200-507 000	F	1	SCREW, CROSS-RECESS, PH	
4	XA4-7200-359 000	F	2	SCREW, CROSS-RECESS, PH	
2,4,6	XA4-7200-459 000	F	18	SCREW, CROSS-RECESS, PH	
4	XA4-7200-609 000	F	4	SCREW, CROSS-RECESS	
4	XA4-9170-557 000	F	3	SCREW, CROSS-RECESS, PH	
4	XA4-9170-609 000	F	1	SCREW, CROSS-RECESS, PH	
4	XA4-9200-709 000	F	5	SCREW, CROSS-RECESS, PH	
2	XA4-9260-709 000	F	4	SCREW, CROSS-RECESS, PH	
2	XA9-0435-000 000	F	2	SCREW, CROSS-RECESS, PH	
2	XA9-0449-000 000	F	2	SCREW, CROSS-RECESS	
2	XA9-0503-000 000	F	3	SCREW, CROSS-RECESS, PH	
14	XB4-6201-609 000	F	2	SCREW, CROSS-RECESS	
4	XB4-6260-607 000	F	1	SCREW M2.6X6	
4	X96-1723-500 000	F	1	SCREW	
4	X96-1723-610 000	F	2	SCREW, SLOTTED, SHOULDER	
4	YA1-0061-000 000	C	1	HOLDER, LITHIUM BATTERY	
4	YA1-0064-000 000	B	1	SHEET, ZOOM	
4	YF1-0004-000 000	C	1	BLIND, IG METER (A)	
4	YG9-5021-000 000	C	1	PHOTO REFLECTOR C.B.A.	
4	YG9-5022-000 000	C	1	AF MOTOR ASS'Y	
4	YG9-5023-000 000	C	1	PZ MOTOR ASS'Y	
4	YH8-0002-000 000	C	1	IG METER	
10	Y22-8012-000 000	B	1	LED GL452S	
8	Y22-8120-000 000	B	1	SENSOR, DEW	
10	Y22-8121-000 000	B	2	PHOTO IC SPI-315-25-CD	
10	Y22-8123-000 000	B	2	PHOTO TRANSISTOR EE-P109	



## CONTENTS

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#### <Guide to diagrams>

##### 1. Color coding

###### (1) Single lines in block diagrams

###### Camera section

Red (——) : Y/Y+C  
(----) : C

###### AUTO-FOCUS section

Red (——) : ES  
(----) : CU

###### Syscon-servo section

Red (——) : Drum servo signal  
(----) : Capstan servo signal

###### Video section

Red (——) : Recording  
(----) : Playback

###### (2) Voltage on circuit diagram

Red : Recording  
Black : Playback

###### (3) Signal lines in circuit diagrams

###### Camera section

Red : Power supply line  
Blue : Luminance signal  
Orange : Chrominance signal  
Gray (——) : Luminance +  
Chrominance  
signals

###### Recorder section

Blue (——) : Capstan PWM signal  
(----) : Capstan ATF signal  
(----) : Capstan FG signal  
Orange (——) : Drum PWM signal  
(----) : Drum FG signal  
(----) : Drum PG signal

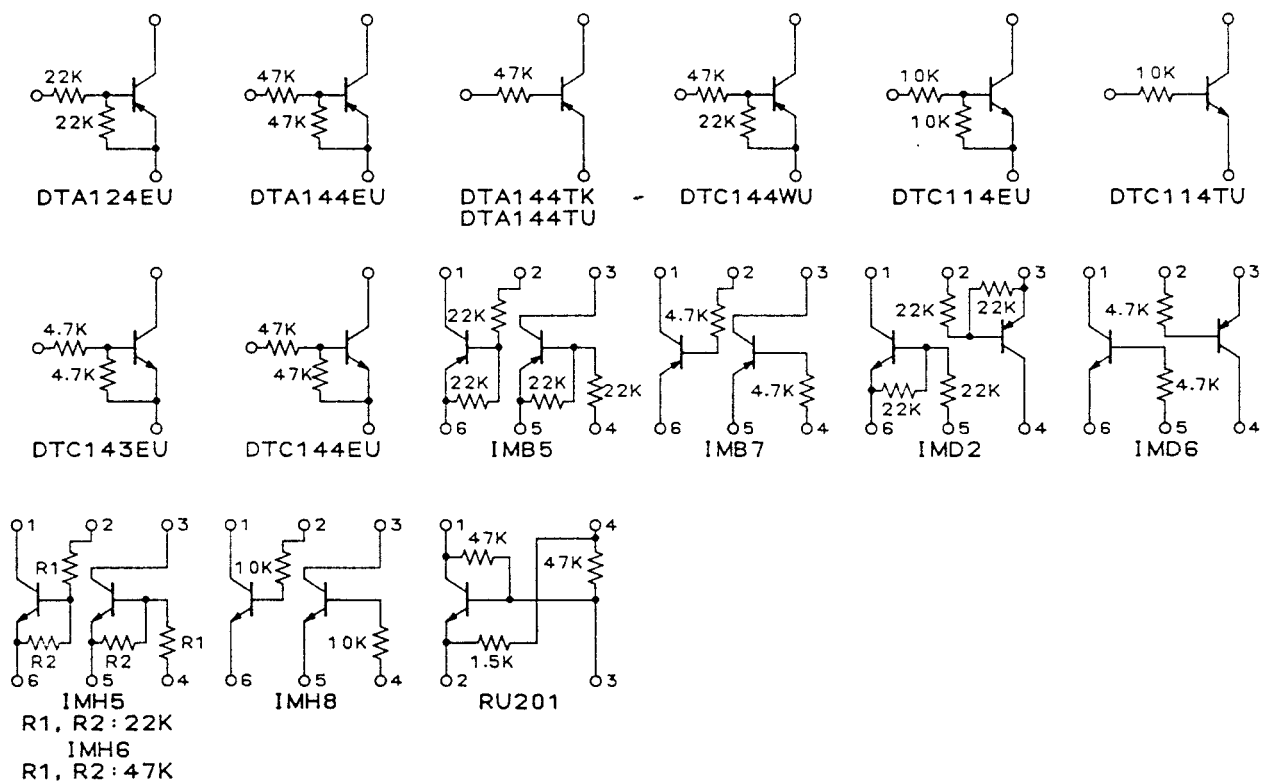
###### Recorder section

Gray (——) : Recording luminance +  
Chrominance signals  
(----) : Playback luminance +  
Chrominance signals  
Blue (——) : Recording luminance  
signal  
(----) : Playback luminance signal  
(----) : Recording Hi8 luminance  
signal  
Orange (——) : Recording chrominance  
signal  
(----) : Playback chrominance  
signal  
Red (——) : Recording audio signal  
(----) : Playback audio signal

#### (4) PC board layout

Orange : Component side  
 Hatched black (▨) : Soldering side  
 Black : Parts on component side  
 Blue : Parts on soldering side

#### 2. Equivalent circuits of digital transistor



#### 3. Indications in circuit diagram

- Resistance is represented in ohms ( $\Omega$ ).
- Capacitance is represented in farads (F).
- Wattage of resistor is 1/16 W unless otherwise specified.
- Voltages are measured with a digital voltmeter.
- Waveform photographs are taken by using a 10:1 probe.
- IC Nos. in C.B.A.s are listed on the bottom of diagrams.
- Nos. colored in blue correspond to the Nos. of waveform photographs.
- Voltage values indicated in circuit diagram are based on the following condition.

##### Camera section

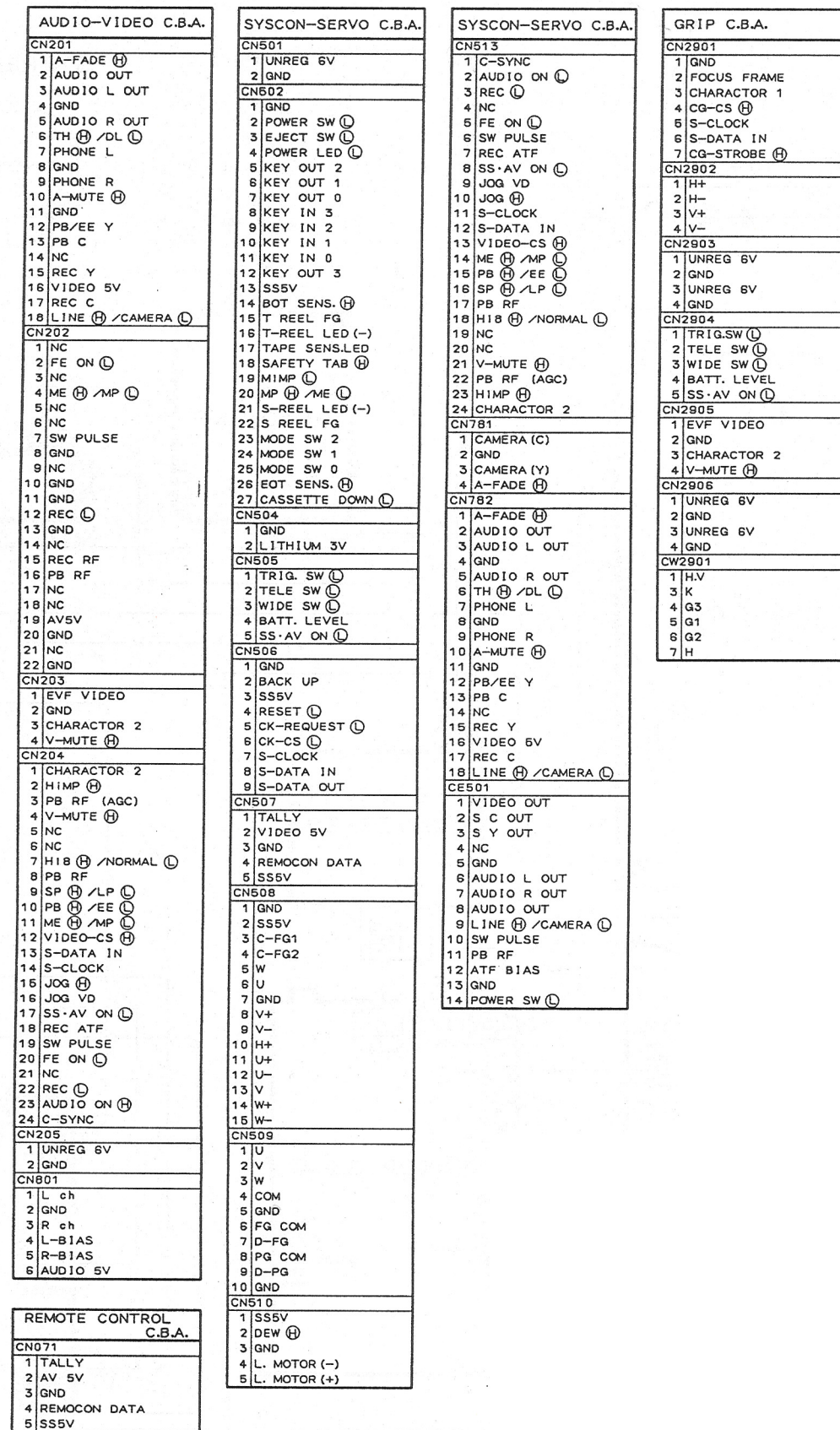
Colorbar, standard angle of view, AWB-preset

##### Recorder section

Recording : Colorbar (pattern generator) Hi8 tape

Playback : Self-recording playback tape (Colorbar signal) \* Hi8 tape used.

# INTERCONNECTION DIAGRAM



REMOTE CONTROL C.B.A.

CRT DEFLECTION YOKE

GRIP C.B.A.

POWER/EJECT C.B.A.

CJ C.B.A.

RECORDER-KEY C.B.A.

SYS-CON-SERVO C.B.A.

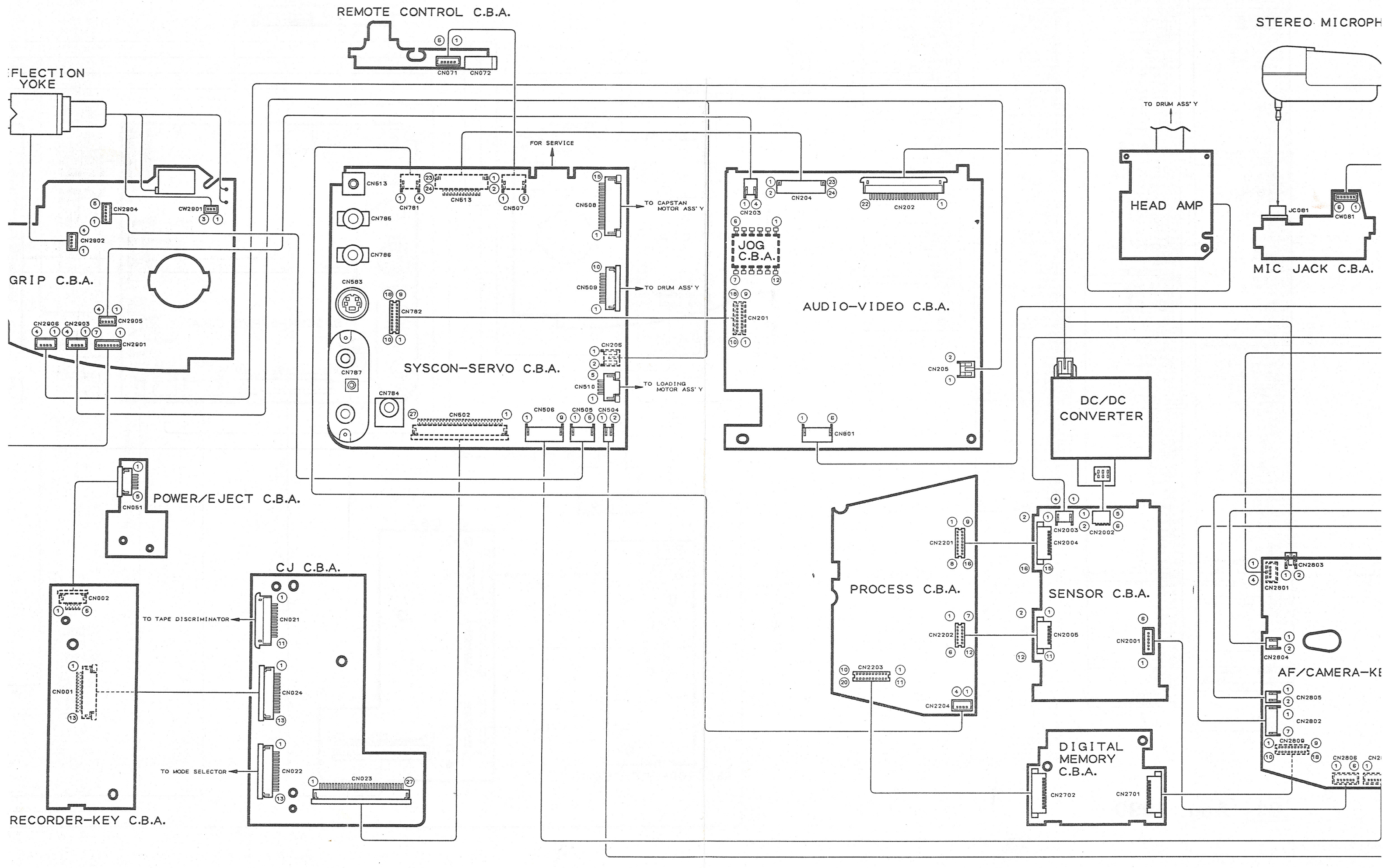
FOR SERVICE

TO CAPSTAN MOTOR ASS'Y

TO DRUM ASS'Y

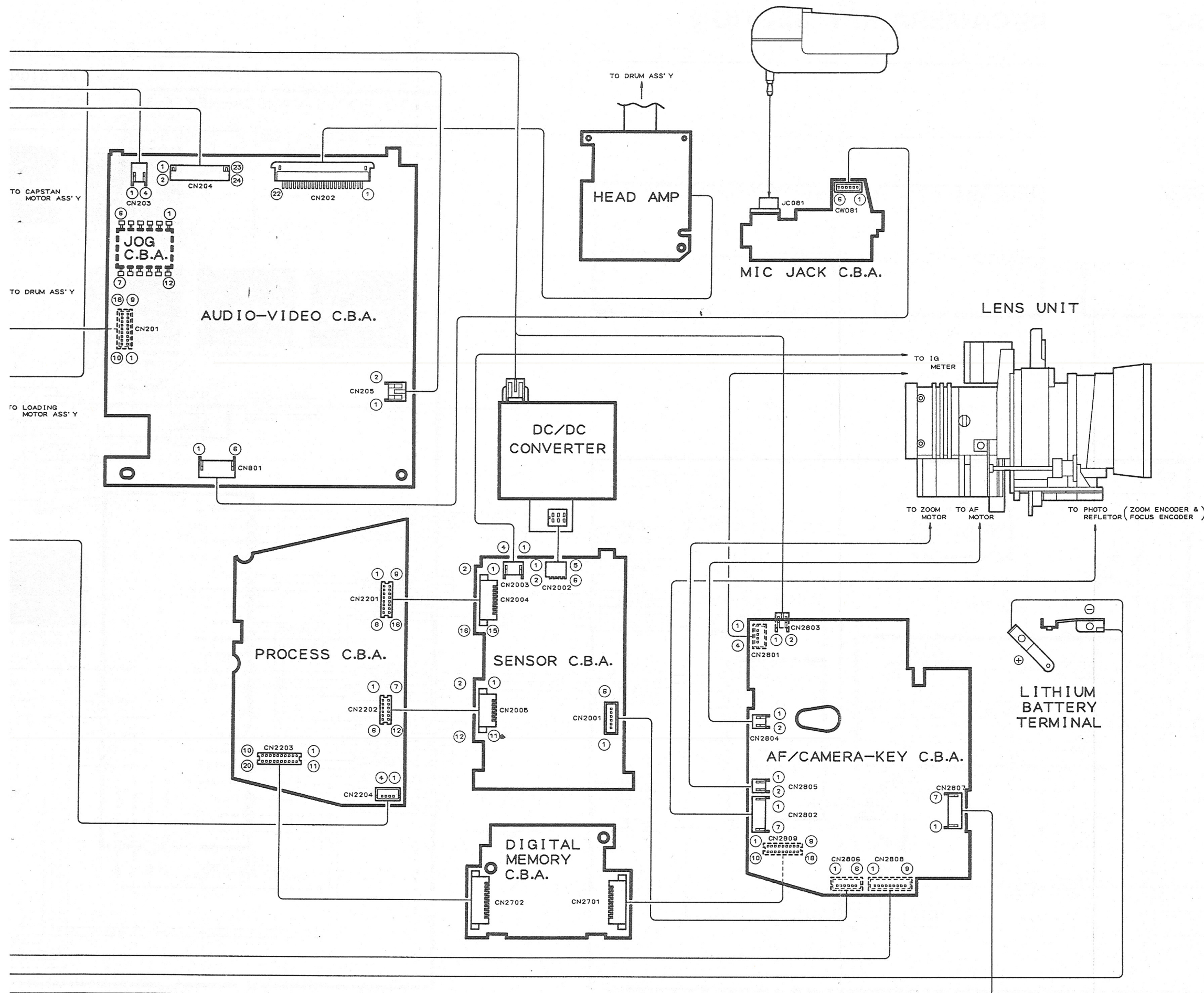
TO LOADING MOTOR ASS'Y







# STEREO MICROPHONE



DIGITAL MEMORY C.B.A.
CN2701
1 GND
2 BACK UP
3 RAM-CS (H)
4 LITHIUM 3V
5 S-CLOCK
6 S-DATA IN
7 BUSY
8 SEE THROUGH (H)
9 SAMPLE LEVEL
10 RGB-CS (H)
11 CHARACTER 1
12 HD
13 VD
14 FADE (H)
15 FAWB (H)
16 SAMPLE FADE (H)
17 Y (AF)
18 RESET (H)
CN2702
1 GND
2 Y (SAMPLE)
3 Y (AF)
4 RESET (L)
5 FAWB (H)
6 SAMPLE FADE (H)
7 CAMERA 5V
8 FADE (H)
9 VD
10 CP2
11 GND
12 HD
13 Y (DM OUT)
14 DM/CG BLK
15 R-Y (PRO OUT)
16 Y (PRO OUT)
17 V REF.
18 B-Y (PRO OUT)
19 B-Y (DM OUT)
20 R-Y (DM OUT)

AF/CAMERA-KEY C.B.A.
CN2801
1 OUT (+)
2 IN (-)
3 OUT (-)
4 IN (+)
CN2802
1 LED CONT.
2 LED 5V
3 FOCUS1
4 FOCUS2
5 ZOOM2
6 ZOOM1
7 ZOOM0
CN2803
1 UNREG 6V.
2 GND
CN2804
1 TELE (H)
2 WIDE (H)
CN2805
1 AF FAR
2 AF NEAR
CN2806
1 GND
2 CAMERA 5V
3 CAMERA ON (L)
4 SHUTTER SPEED 1
5 SHUTTER SPEED 2
6 SHUTTER SPEED 3
CN2807
1 GND
2 FOCUS FRAME
3 CHARACTER 1
4 CG-CS (H)
5 S-CLOCK
6 S-DATA OUT
7 CG-STROBE (H)
CN2808
1 GND
2 BACK UP
3 SSV
4 RESET (L)
5 CK-REQUEST (L)
6 CK-CS (L)
7 S-CLOCK
8 S-DATA OUT
9 S-DATA IN
CN2809
1 GND
2 BACK UP
3 RAM-CS (H)
4 TITLE-CS (H)
5 S-CLOCK
6 S-DATA OUT
7 BUSY
8 SEE THROUGH (H)
9 SAMPLE LEVEL
10 RGB-CS (H)
11 CHARACTER 1
12 HD
13 VD
14 FADE (H)
15 FAWB (H)
16 SAMPLE FADE (H)
17 Y (AF)
18 RESET (H)

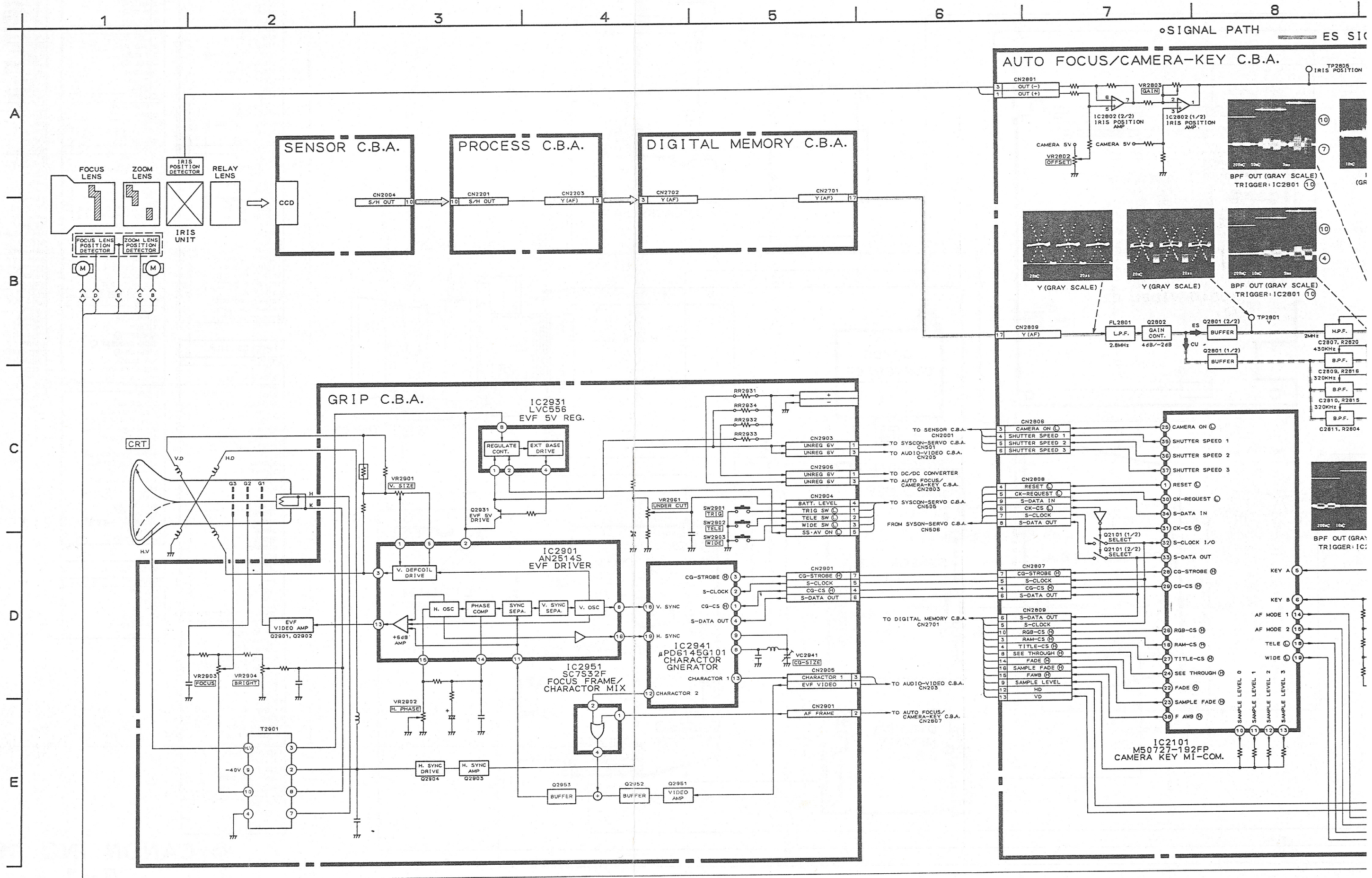
SENSOR C.B.A.
CN2001
1 GND
2 CAMERA 5V
3 CAMERA ON (L)
4 SHUTTER SPEED 1
5 SHUTTER SPEED 2
6 SHUTTER SPEED 3
CN2002
1 9V
2 CAMERA 5V
3 15V
4 GND
5 -8V
6 CAMERA ON (L)
CN2003
1 D+
2 C+
3 D-
4 C-
CN2004
1 C-
2 CAMERA 5V
3 D+
4 C+
5 W BLK
6 Y0H
7 Y1H
8 C0H
9 GND
10 S/H OUT
11 C1H
12 CP08
13 FH/2
14 CP2+P BLK
15 CSP 1
16 CSP 2
CN2005
1 C BLK
2 PLL
3 WHD
4 CP2
5 SYNC
6 BF
7 SC (90)
8 CP2+C BLK
9 SC
10 GND
11 HD
12 VD

PROCESS C.B.A.
CN2201
1 C-
2 CAMERA 5V
3 D+
4 C+
5 W BLK
6 Y0H
7 Y1H
8 C0H
9 GND
10 S/H OUT
11 C1H
12 CP08
13 FH/2
14 CP2+P BLK
15 CSP 1
16 CSP 2
CN2202
1 C BLK
2 PLL
3 WHD
4 CP2
5 SYNC
6 BF
7 SC (90)
8 CP2+C BLK
9 SC
10 GND
11 HD
12 VD
CN2203
1 GND
2 Y (SAMPLE)
3 Y (AF)
4 RESET (L)
5 FAWB (H) / LOCK (L)
6 SAMPLE FADE (H)
7 CAMERA 5V
8 FADE (H)
9 VD
10 CP2
11 GND
12 HD
13 Y (DM OUT)
14 DM/CG BLK
15 R-Y (PRO OUT)
16 Y (PRO OUT)
17 +1.8V
18 B-Y (PRO OUT)
19 B-Y (DM OUT)
20 R-Y (DM OUT)
CN2204
1 C OUT
2 GND
3 Y OUT
4 AUDIO FADE

MIC JACK C.B.A.
CW081
1 L ch
2 GND
3 R ch
4 L-BIAS
5 R-BIAS
6 AUDIO 5V

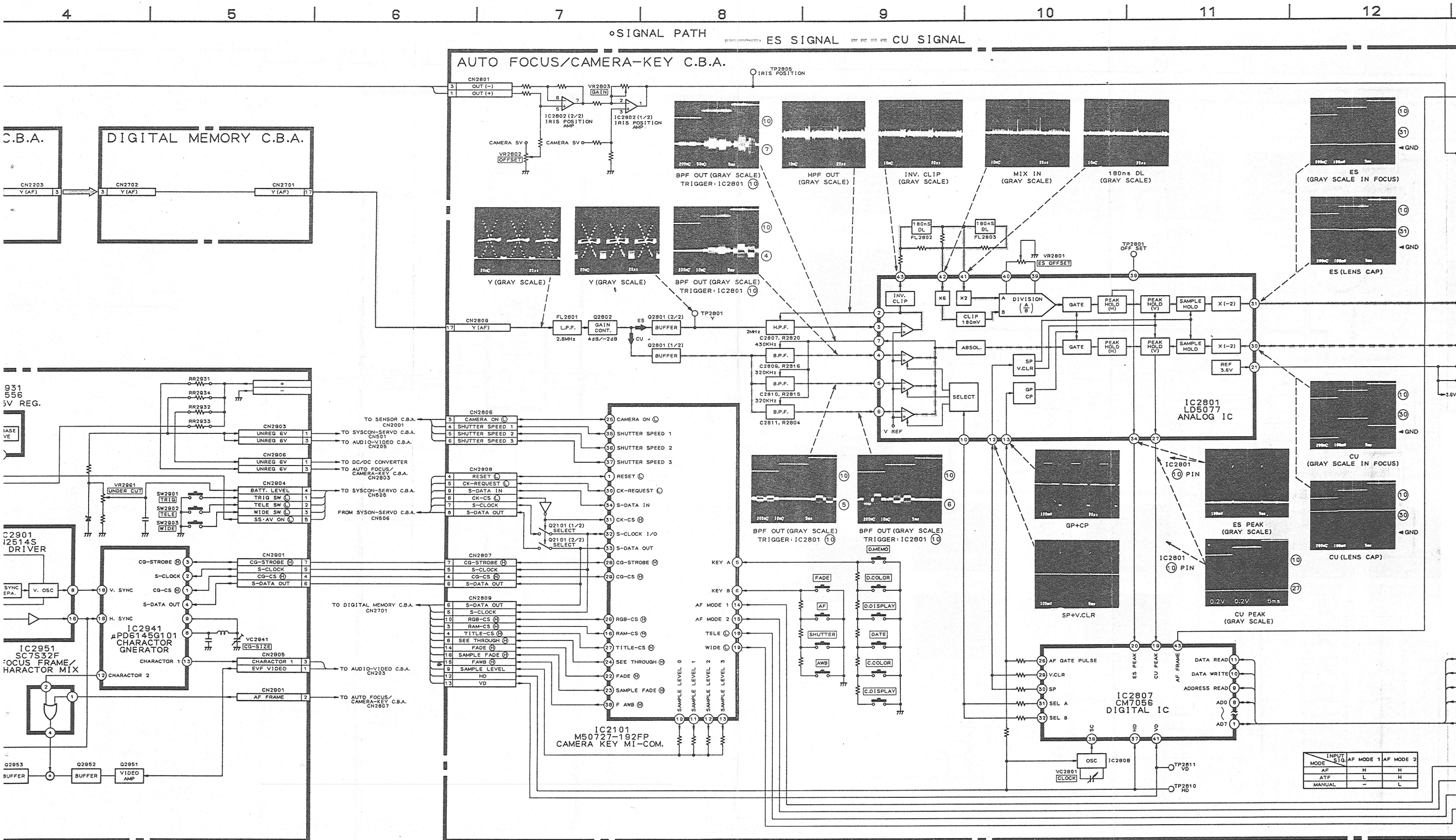


## BLOCK DIAGRAM GRIP • AUTO FOCUS/CAMERA-KEY SECTION





## ERA-KEY SECTION





9

10

11

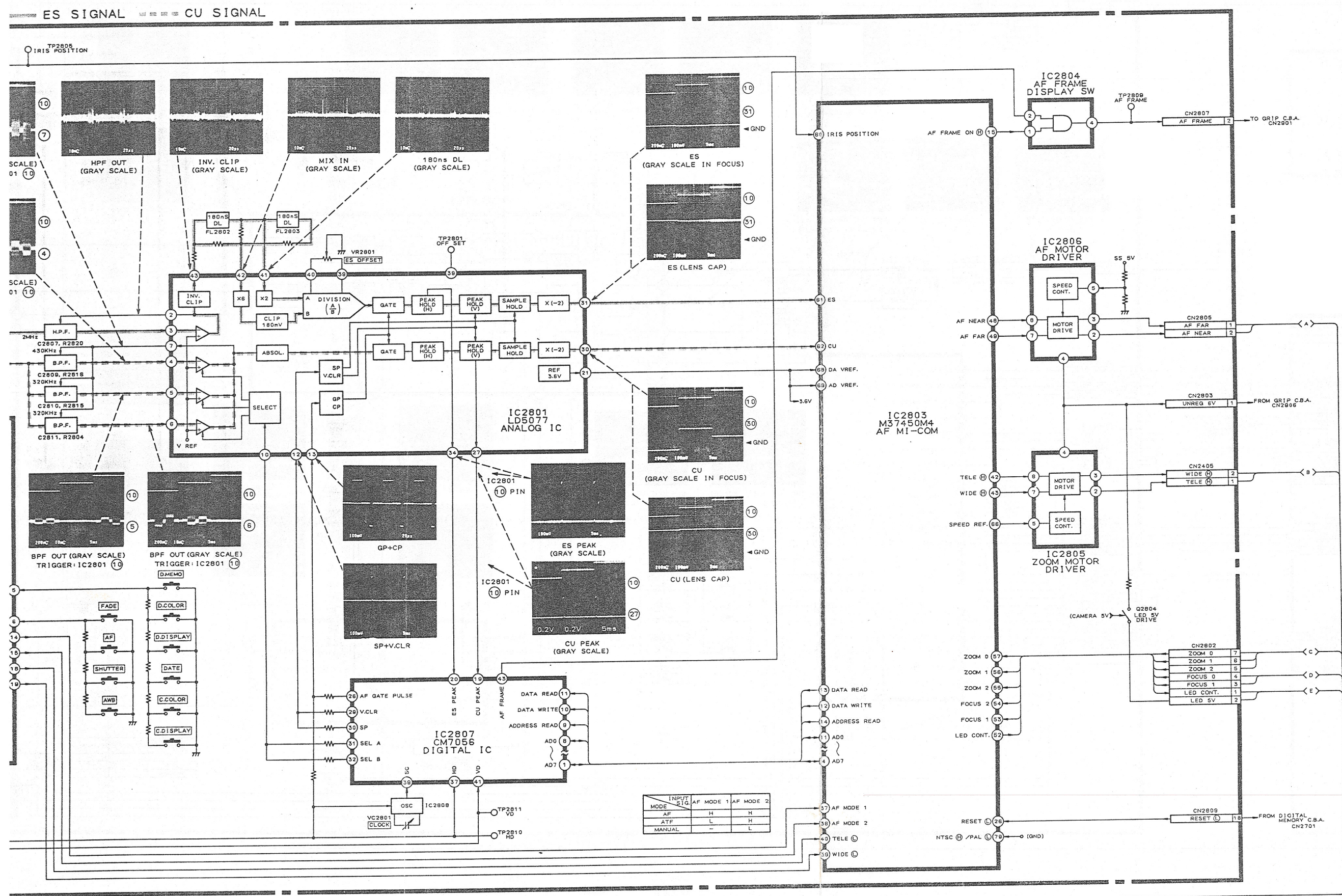
12

13

14

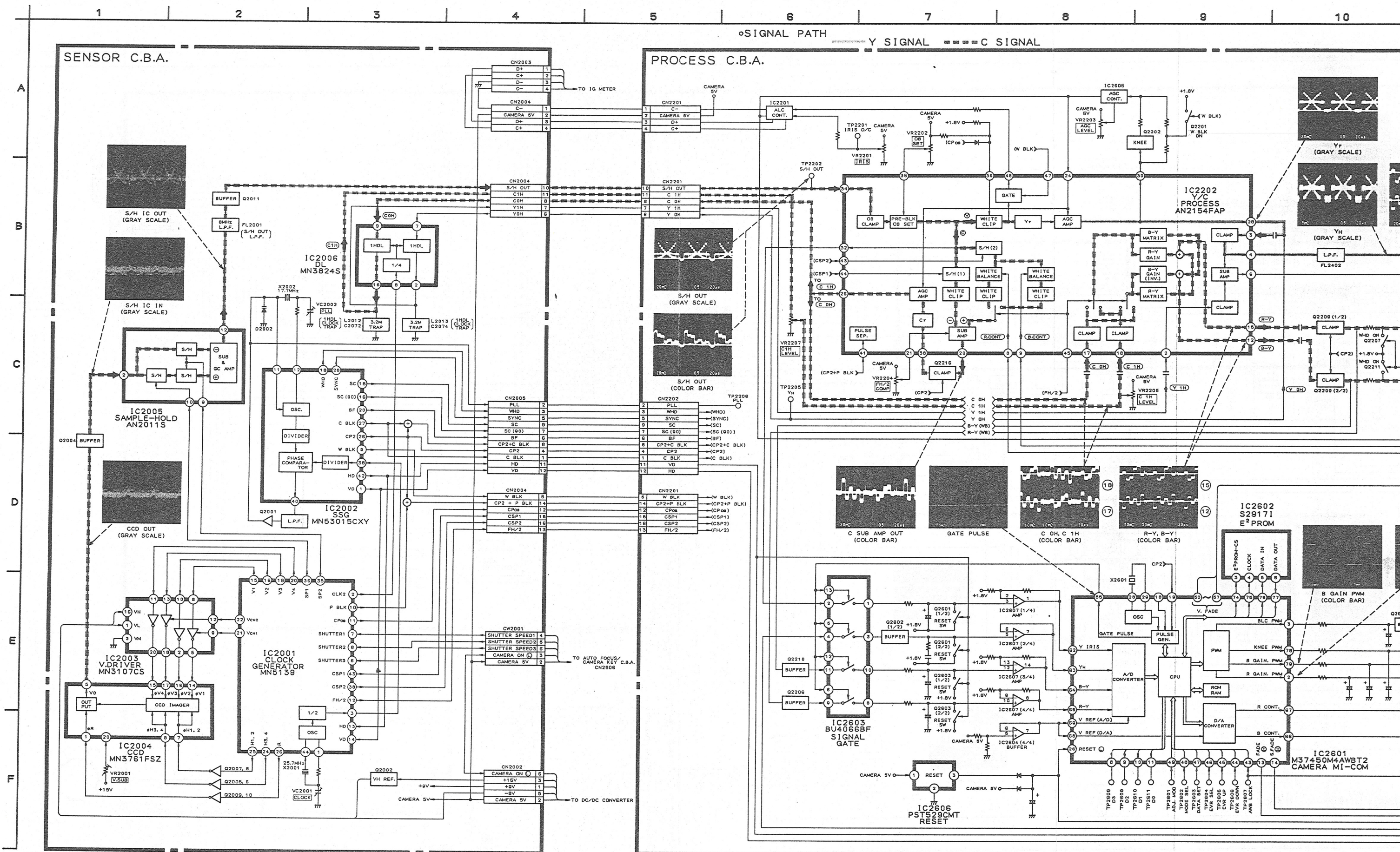
15

ES SIGNAL CU SIGNAL

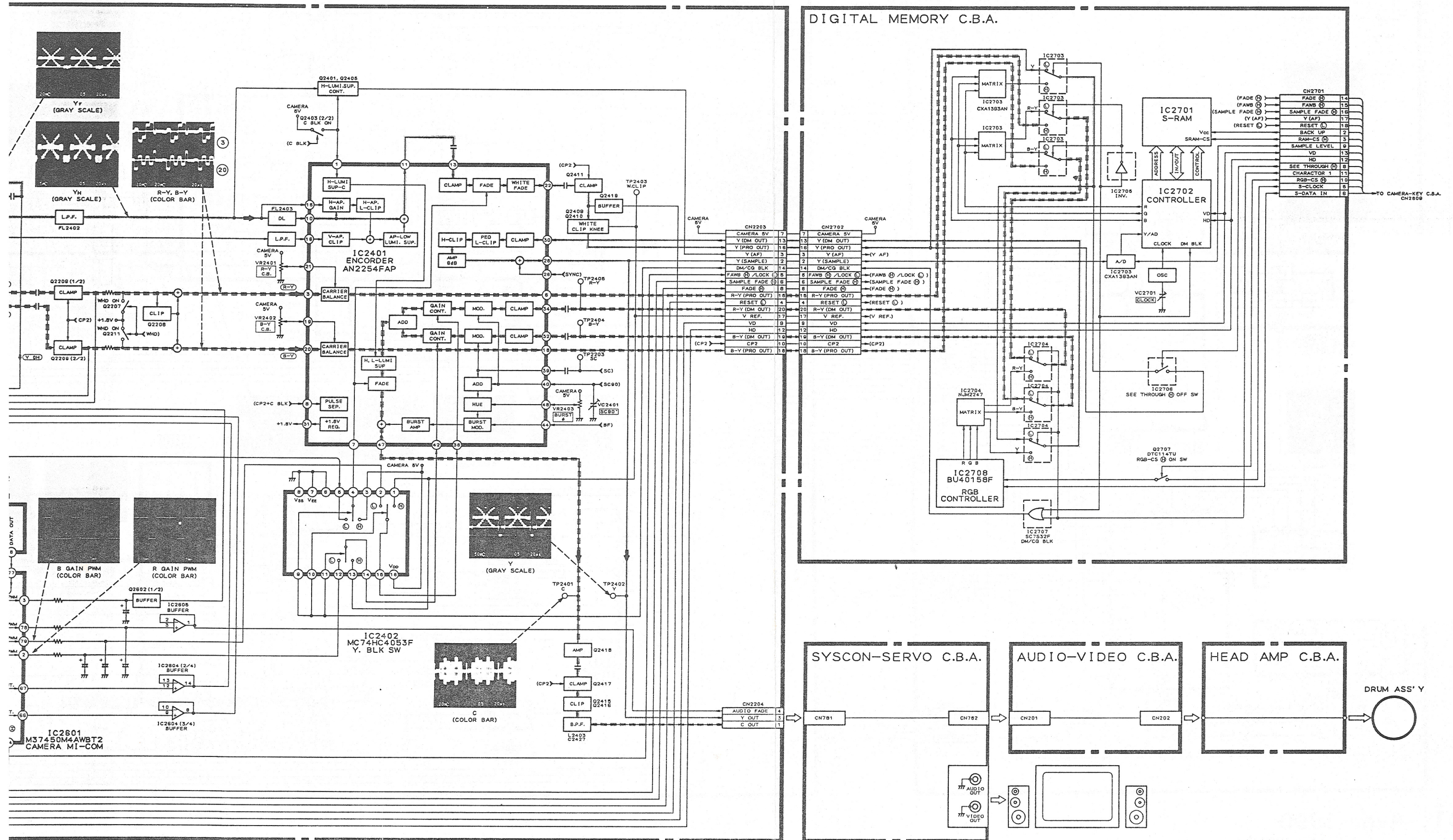




# BLOCK DIAGRAM SENSOR · PROCESS · DIGITAL MEMORY SECTION

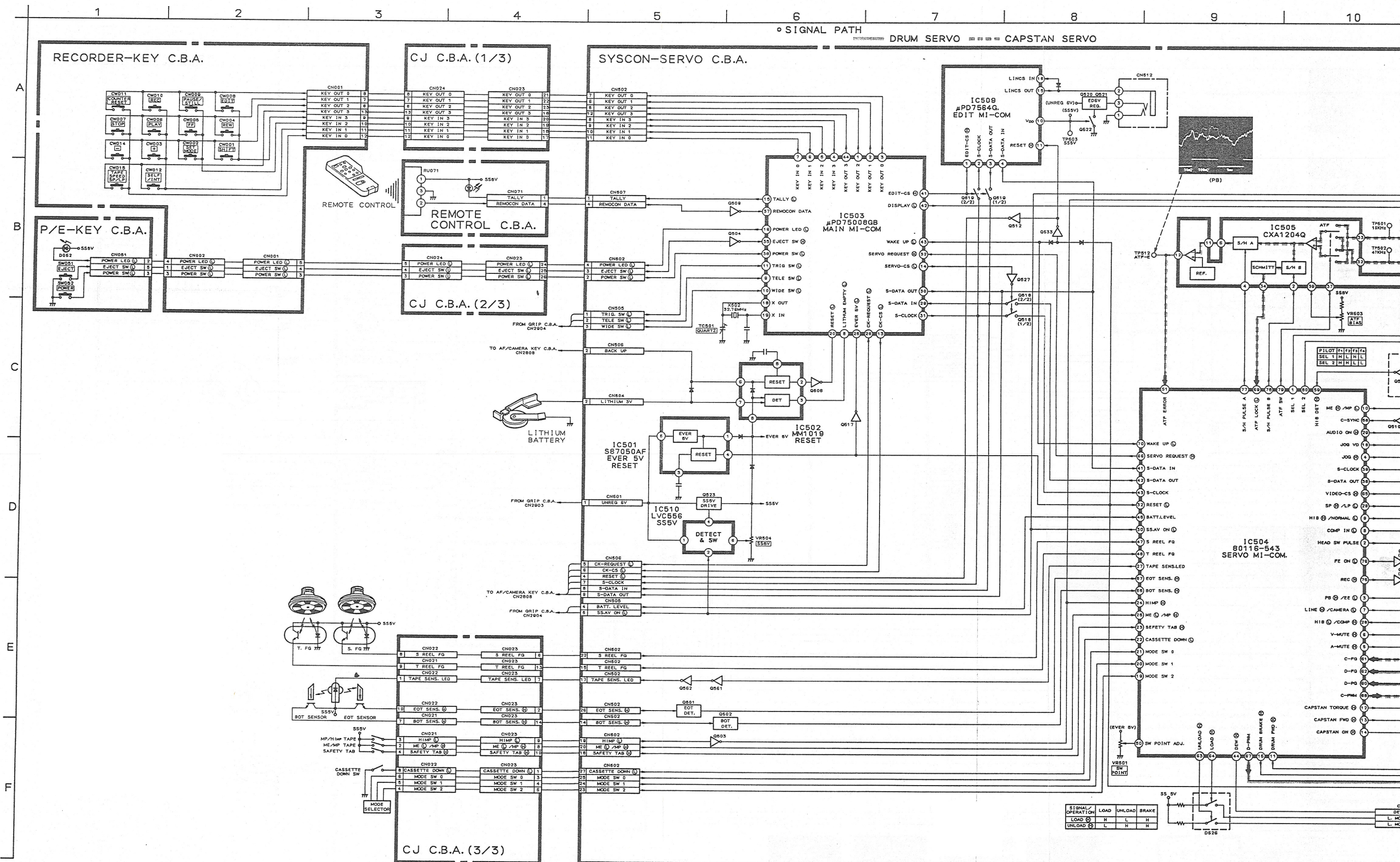








# BLOCK DIAGRAM SYSCON-SERVO SECTION



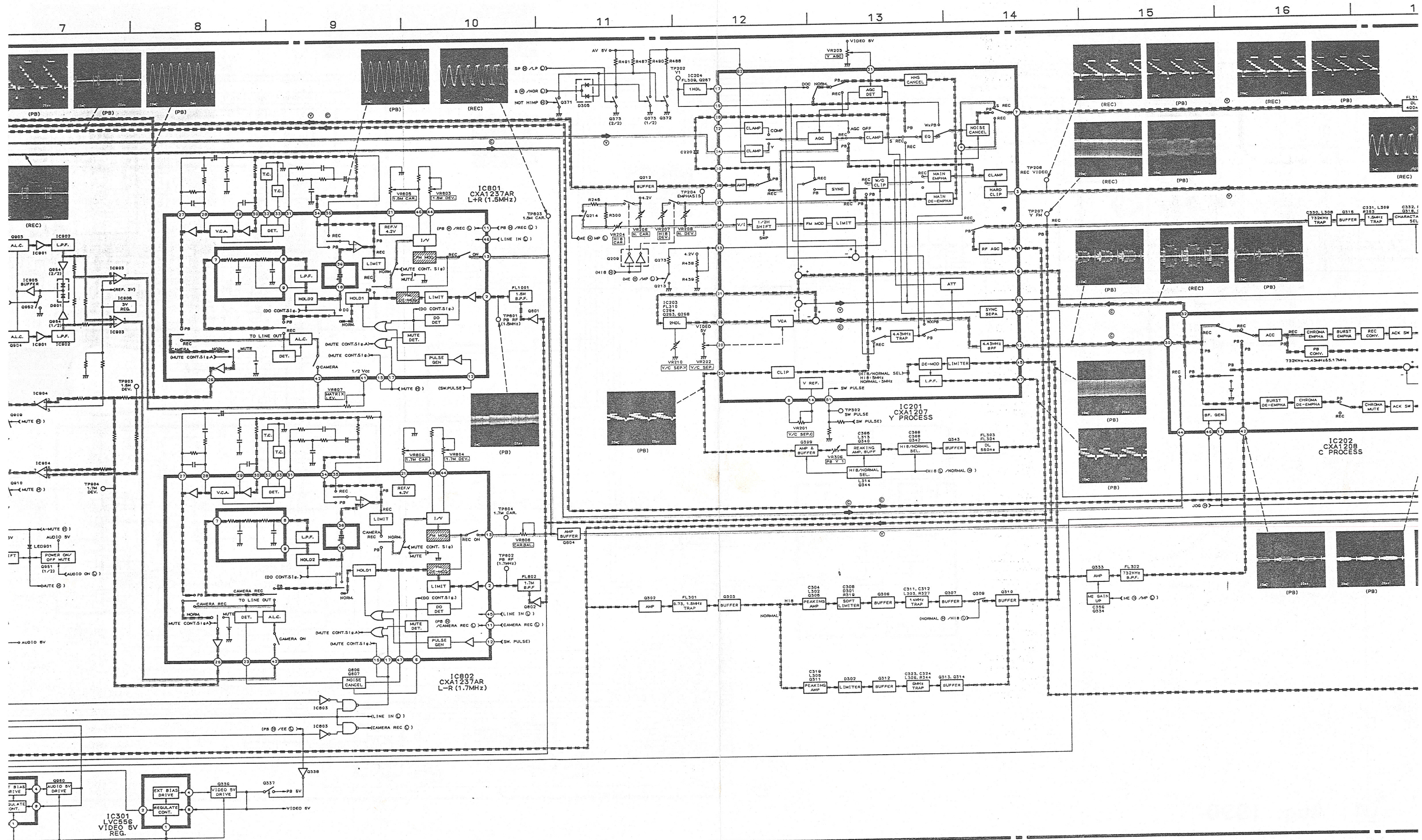




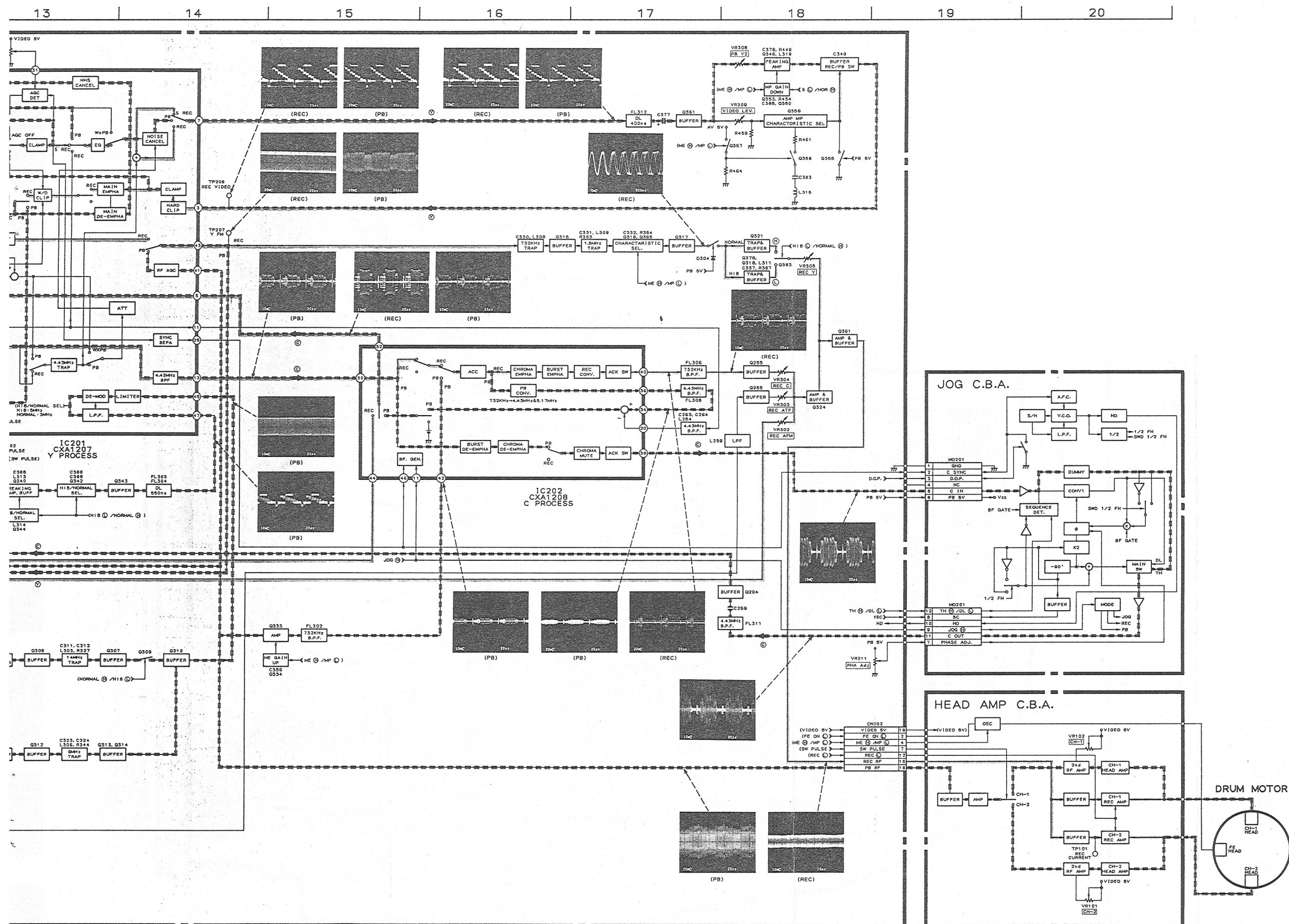


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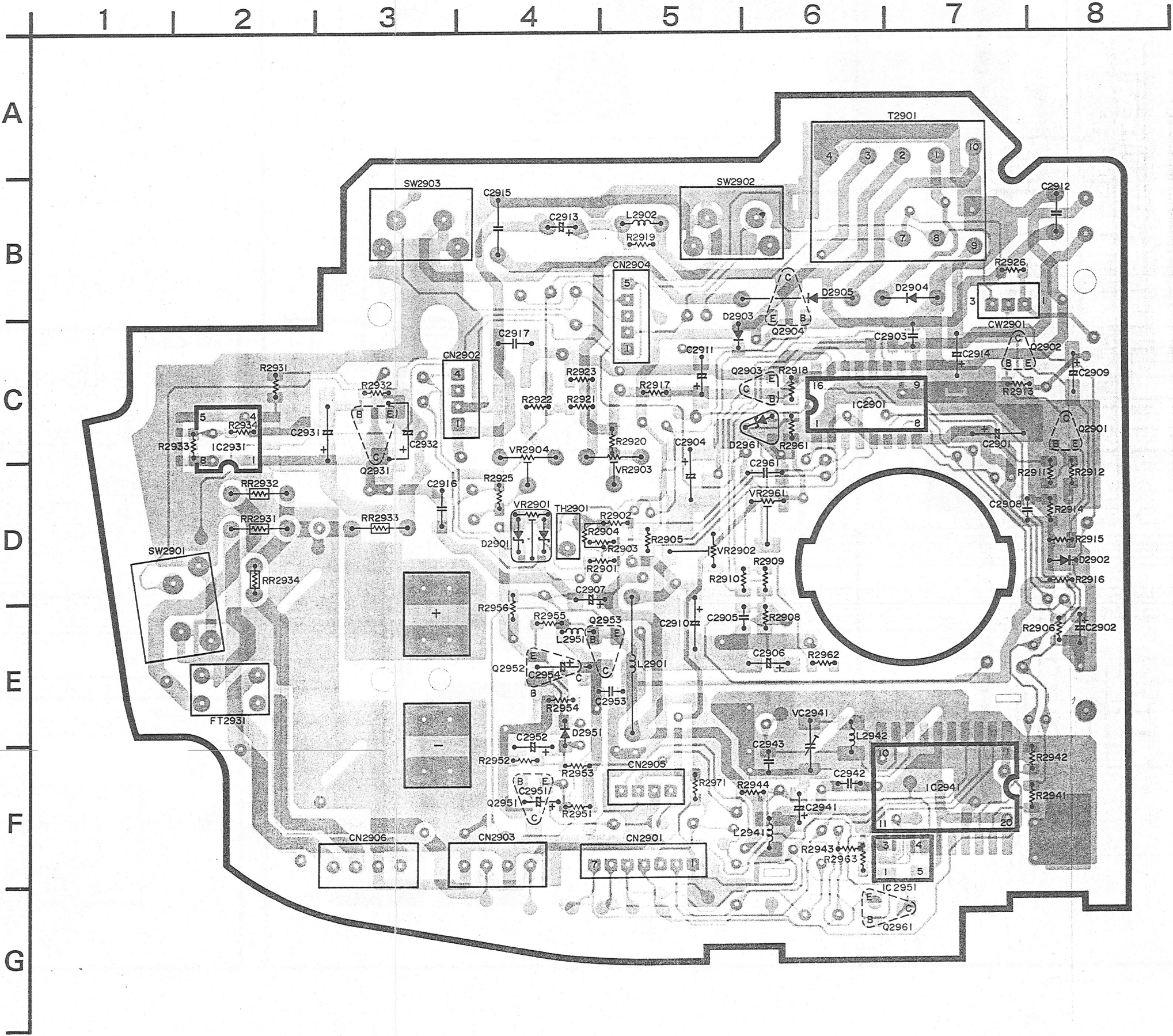




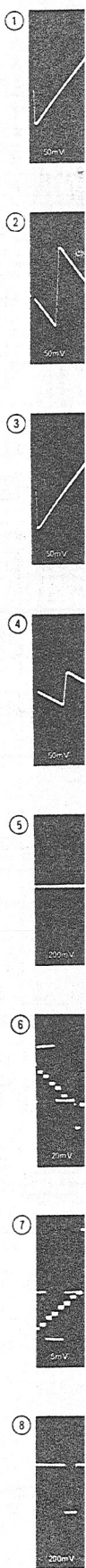
CIRCUIT BOARD DIAGRAM GRIP • AUTO FOCUS/CAMERA-KEY C.B.A.

GRIP C.B.A.

D 2 9 0 1	D - 4
D 2 9 0 2	D - 8
D 2 9 0 3	C - 5
D 2 9 0 4	B - 7
D 2 9 0 5	B - 6
D 2 9 5 1	E - 4
D 2 9 6 1	C - 6
I C 2 9 0 1	C - 6
I C 2 9 3 1	C - 2
I C 2 9 4 1	F - 7
I C 2 9 5 1	F - 7
Q 2 9 0 1	C - 8
Q 2 9 0 2	C - 7
Q 2 9 0 3	C - 6
Q 2 9 0 4	B - 6
Q 2 9 3 1	C - 3
Q 2 9 5 1	F - 4
Q 2 9 5 2	E - 4
Q 2 9 5 3	E - 5
Q 2 9 6 1	G - 7
V C 2 9 4 1	E - 6
V R 2 9 0 1	D - 4
V R 2 9 0 2	D - 5
V R 2 9 0 3	D - 5
V R 2 9 0 4	D - 4
V R 2 9 6 1	D - 6

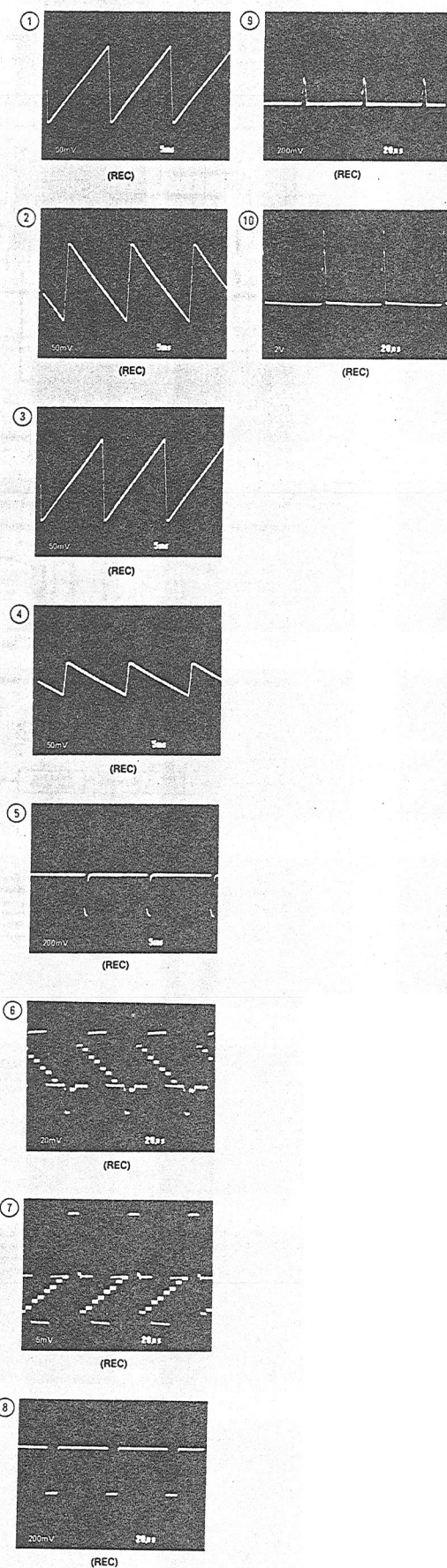


SIG



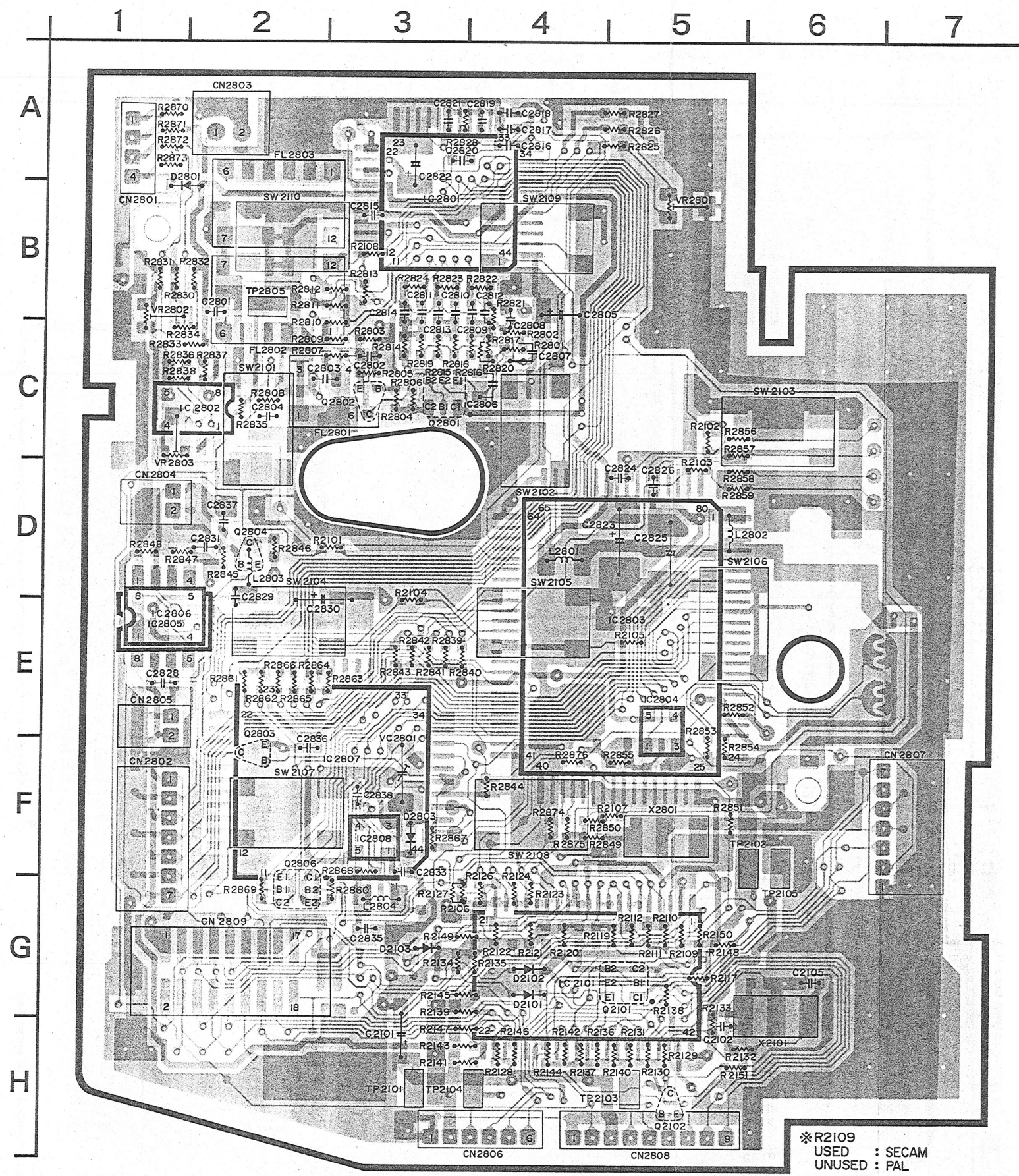


# SIGNAL WAVEFORMS

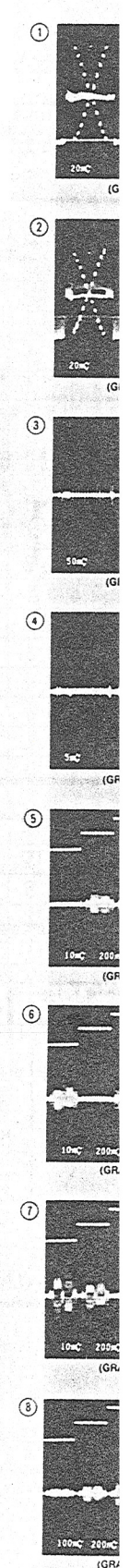


# AUTO FOCUS/CAMERA-KEY C.B.A.

D 2101	G-4
D 2102	G-4
D 2103	G-3
D 2801	B-1
D 2803	F-3
IC 2101	G-4
IC 2801	B-3
IC 2802	C-2
IC 2803	E-5
IC 2804	E-5
IC 2805	E-1
IC 2806	E-1
IC 2807	F-3
IC 2808	F-3
Q 2101	G-5
Q 2102	H-5
Q 2801	C-3
Q 2802	C-3
Q 2803	F-2
Q 2804	D-2
Q 2806	G-2
TP 2101	H-3
TP 2102	F-6
TP 2103	H-5
TP 2104	H-4
TP 2805	B-2
VC 2801	F-3
VR 2801	B-5
VR 2802	B-1
VR 2803	C-1

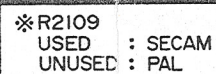


# SIGNAL





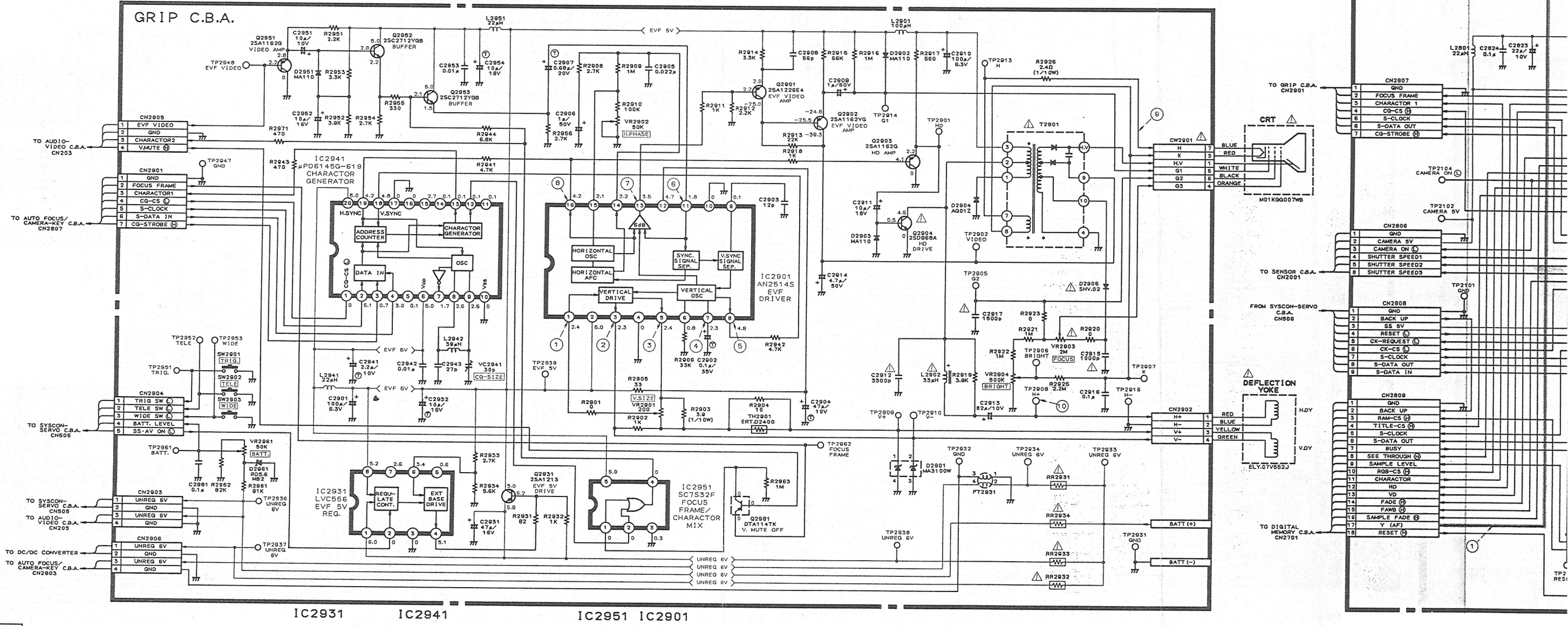
D 2 1 0 1	G-4
D 2 1 0 2	G-4
D 2 1 0 3	G-3
D 2 8 0 1	B-1
D 2 8 0 3	F-3
C 2 1 0 1	G-4
C 2 8 0 1	B-3
C 2 8 0 2	C-2
C 2 8 0 3	E-5
C 2 8 0 4	E-5
C 2 8 0 5	E-1
C 2 8 0 6	E-1
C 2 8 0 7	F-3
C 2 8 0 8	F-3
Q 2 1 0 1	G-5
Q 2 1 0 2	H-5
Q 2 8 0 1	C-3
Q 2 8 0 2	C-3
Q 2 8 0 3	F-2
Q 2 8 0 4	D-2
Q 2 8 0 6	G-2
P 2 1 0 1	H-3
P 2 1 0 2	F-6
P 2 1 0 3	H-5
P 2 1 0 4	H-4
P 2 1 0 5	F-6
P 2 8 0 5	B-2
C 2 8 0 1	F-3
R 2 8 0 1	B-5
R 2 8 0 2	B-1
R 2 8 0 3	C-1

[illegible]



SCHEMATIC DIAGRAM GRIP • AUTO FOCUS/CAMERA-KEY C.B.A.

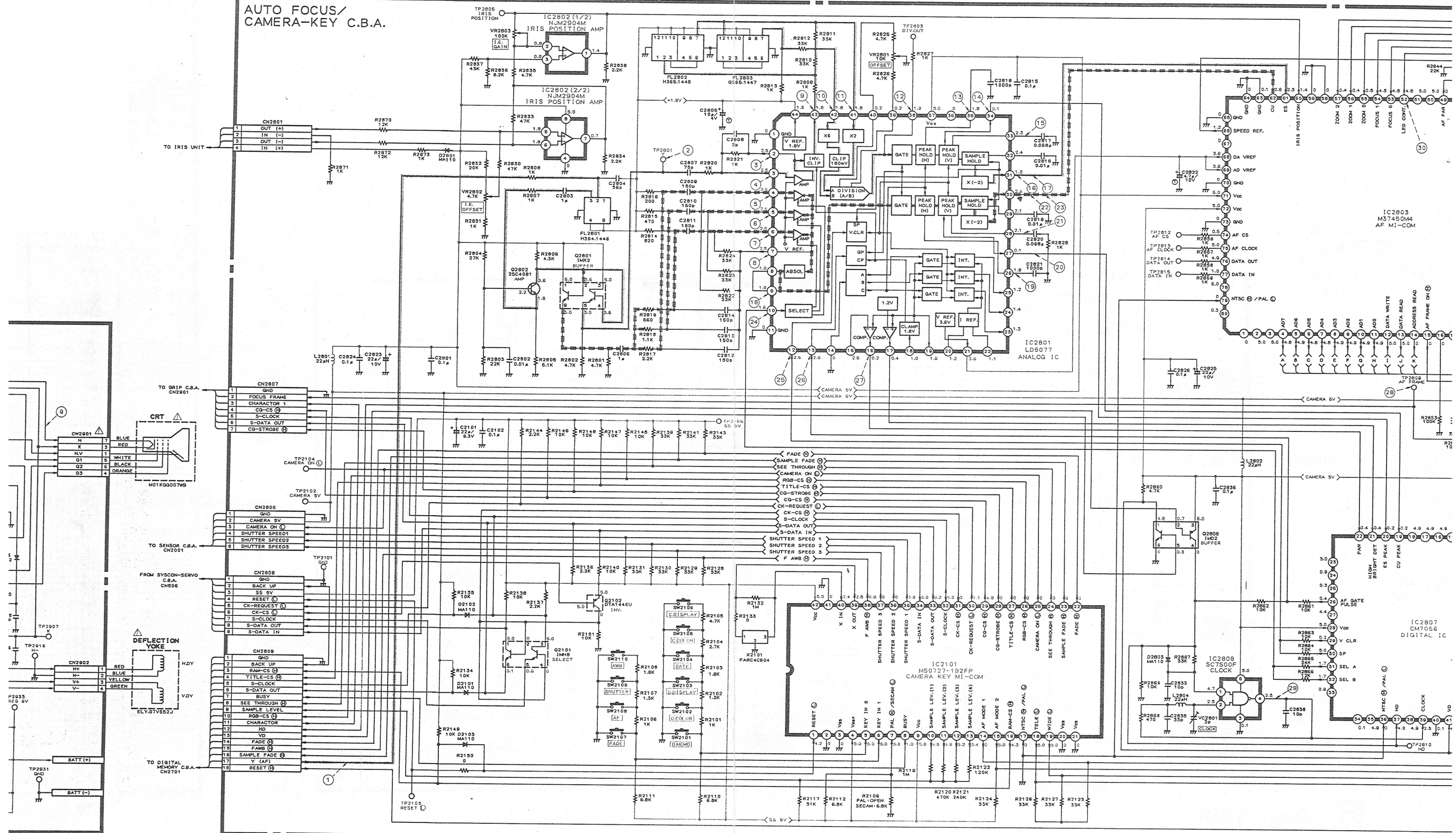
AUTO FOCUS/  
CAMERA-KEY C.B.A.





• SIGNAL PATH  
ES SIGNAL (BLUE) ——— CU SIGNAL (BLUE)

AUTO FOCUS/  
CAMERA-KEY C.B.A.



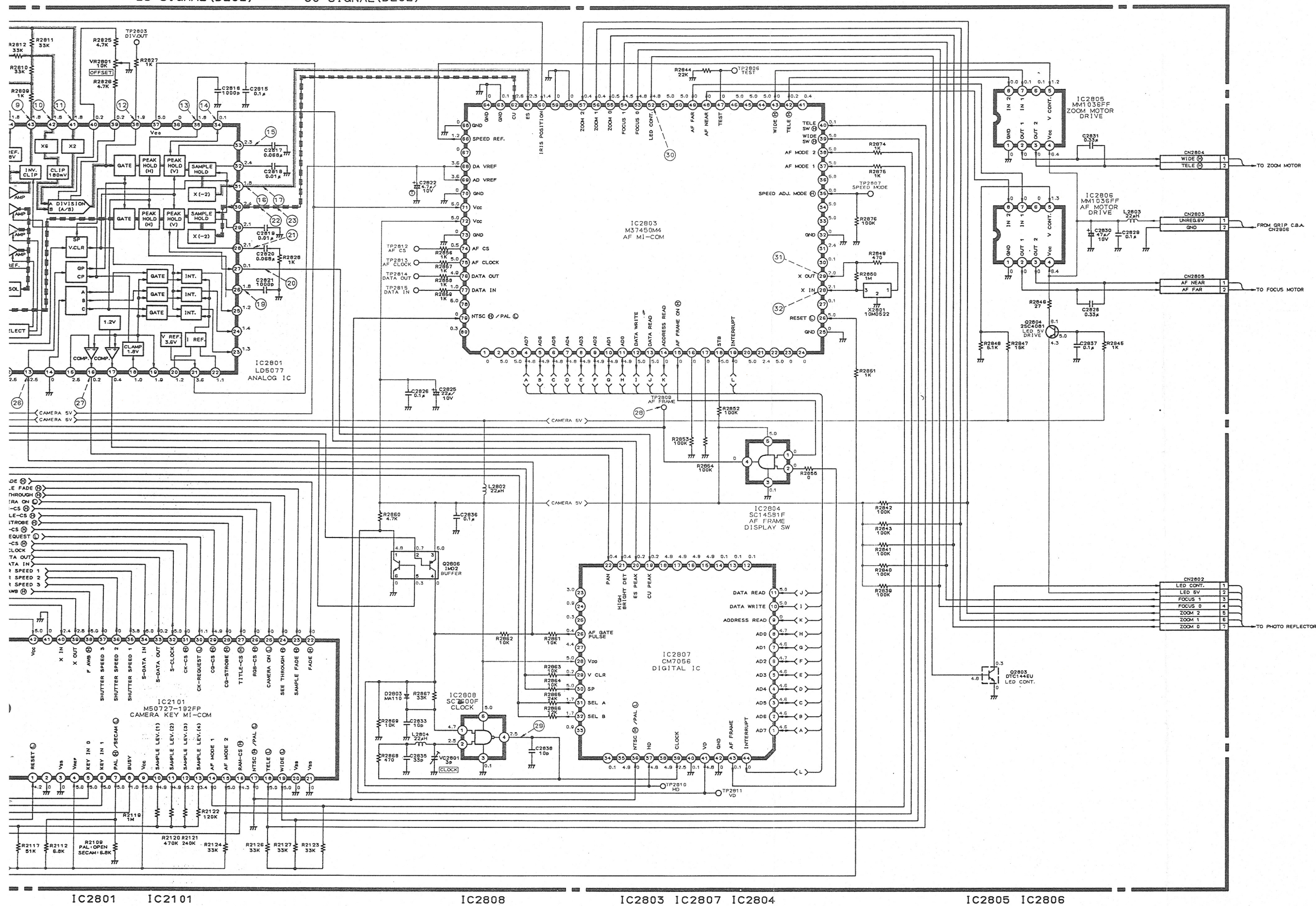
IC2802 (1/2, 2/2)

IC2801 IC2101

IC2808

IC2803 IC2801



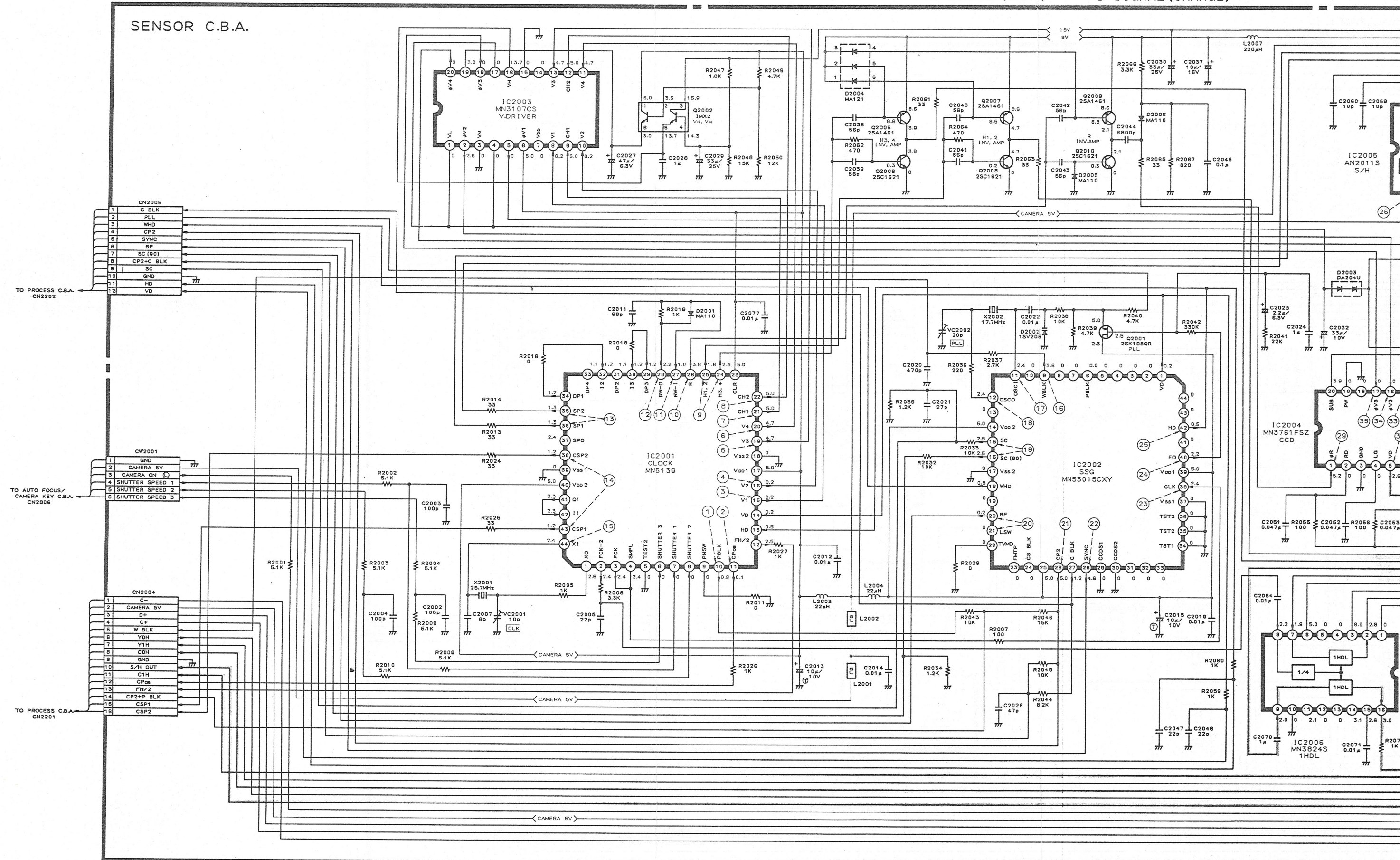


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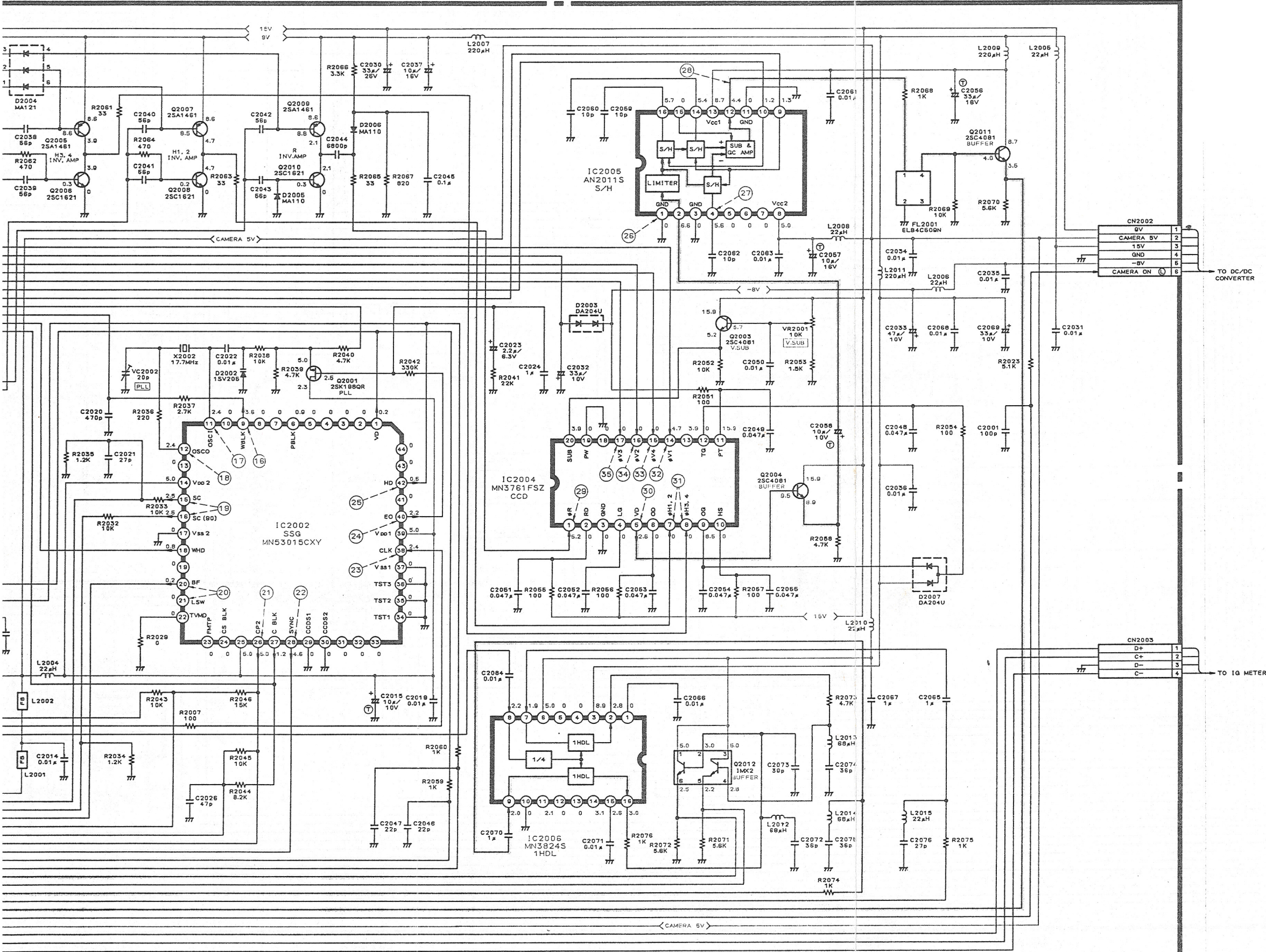
SCHEMATIC DIAGRAM SENSOR C.B.A.

◦ SIGNAL PATH  
Y+C SIGNAL (GRAY) C SIGNAL (ORANGE)





GNAL PATH  
Y+C SIGNAL (GRAY) C SIGNAL (ORANGE)



IC2002 IC2006 IC2004 IC2005

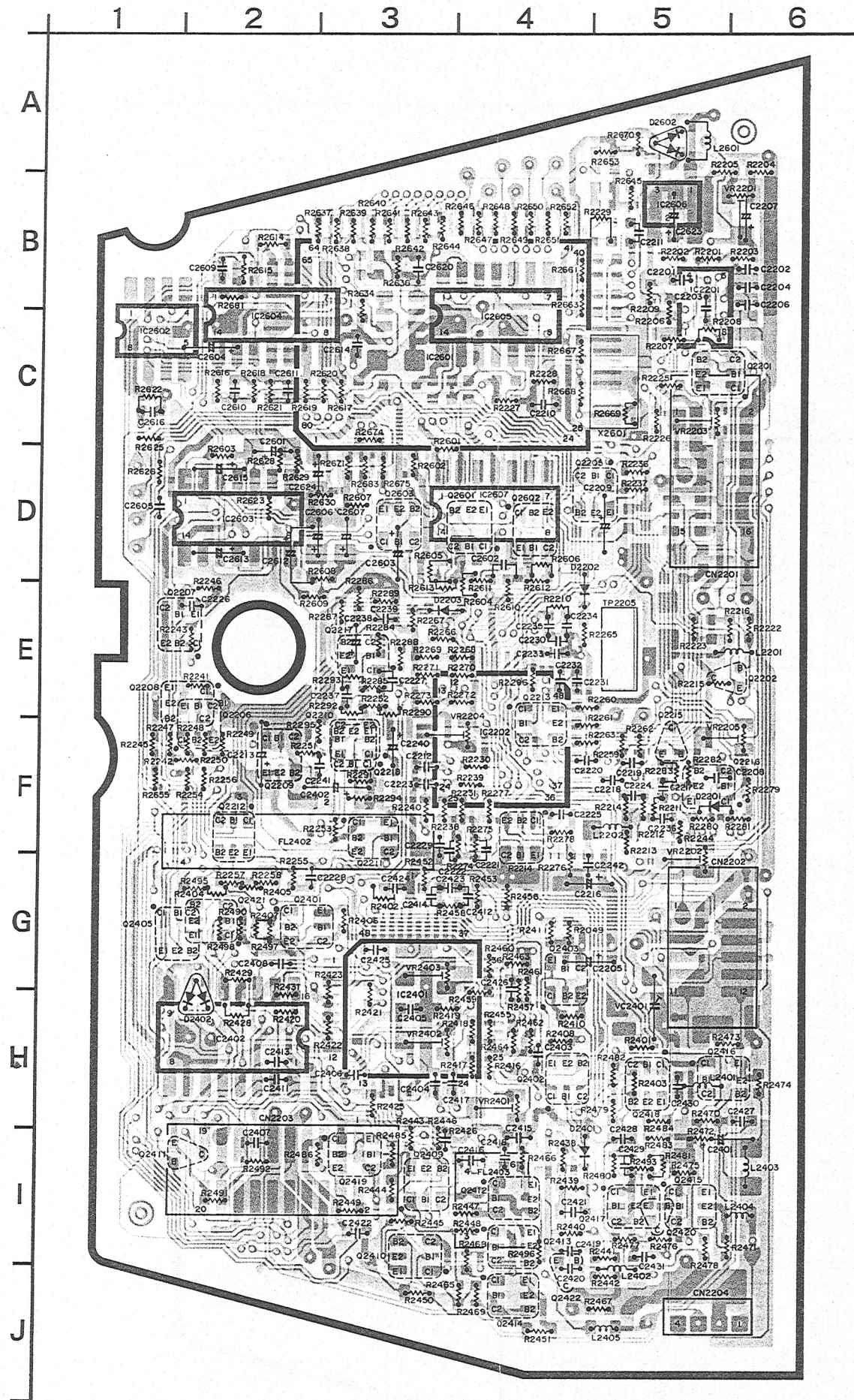


# CIRCUIT BOARD DIAGRAM PROCESS C.B.A.

PROCESS C.B.A.  
(COMPONENT SIDE)

D 2 2 0 1	F-5
D 2 2 0 2	E-6
D 2 2 0 3	E-3
D 2 4 0 1	I-5
D 2 4 0 2	H-2
D 2 6 0 2	A-5
I C 2 2 0 1	B-5
I C 2 2 0 2	E-4
I C 2 4 0 1	H-3
I C 2 4 0 2	H-2
I C 2 6 0 2	C-1
I C 2 6 0 3	D-2
I C 2 6 0 4	C-2
I C 2 6 0 5	C-4
I C 2 6 0 6	B-5
I C 2 6 0 7	D-4
Q 2 2 0 1	C-6
Q 2 2 0 2	E-6
Q 2 2 0 5	D-5
Q 2 2 0 6	E-2
Q 2 2 0 7	E-2
Q 2 2 0 8	E-2
Q 2 2 0 9	F-2
Q 2 2 1 0	F-3
Q 2 2 1 1	F-3
Q 2 2 1 2	F-2
Q 2 2 1 3	F-4
Q 2 2 1 4	F-4
Q 2 2 1 5	F-5
Q 2 2 1 6	F-5
Q 2 2 1 7	E-3
Q 2 2 1 8	F-3
Q 2 4 0 1	G-2
Q 2 4 0 2	H-4
Q 2 4 0 3	G-4
Q 2 4 0 5	G-1
Q 2 4 0 9	I-3
Q 2 4 1 0	I-3
Q 2 4 1 1	I-1
Q 2 4 1 2	I-4
Q 2 4 1 3	I-4
Q 2 4 1 4	J-4
Q 2 4 1 5	I-5
Q 2 4 1 6	H-6
Q 2 4 1 7	I-5
Q 2 4 1 8	H-5
Q 2 4 1 9	I-3
Q 2 4 2 0	I-5
Q 2 4 2 1	G-2
Q 2 4 2 2	J-4
Q 2 6 0 1	D-4

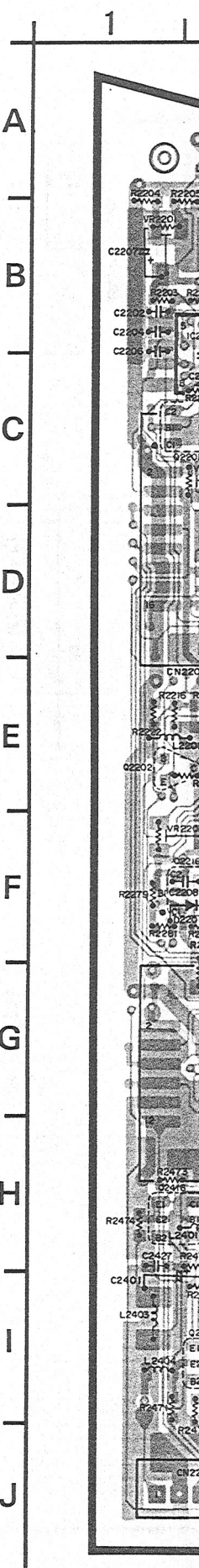
Q 2 6 0 2	D-4
Q 2 6 0 3	D-3
V C 2 4 0 1	H-5
V R 2 2 0 1	B-6
V R 2 2 0 2	G-5
V R 2 2 0 3	C-5
V R 2 2 0 4	F-4
V R 2 2 0 5	F-6
V R 2 4 0 1	H-4
V R 2 4 0 2	H-3
V R 2 4 0 3	G-3



PROCESS C.B.A.  
(SOLDERING SIDE)

D 2 2 0 1	F-2
D 2 2 0 2	E-3
D 2 2 0 3	E-4
D 2 4 0 1	I-3
D 2 4 0 2	H-5
D 2 6 0 2	A-2
I C 2 2 0 1	B-2
I C 2 2 0 2	F-3
I C 2 4 0 1	H-4
I C 2 4 0 2	H-5
I C 2 6 0 1	C-4
I C 2 6 0 2	C-6
I C 2 6 0 3	D-5
I C 2 6 0 4	C-5
I C 2 6 0 5	C-3
I C 2 6 0 6	B-2
I C 2 6 0 7	D-3
Q 2 2 0 1	C-2
Q 2 2 0 2	E-1
Q 2 2 0 5	D-2
Q 2 2 0 6	F-5
Q 2 2 0 7	E-6
Q 2 2 0 8	E-6
Q 2 2 0 9	F-5
Q 2 2 1 0	F-4
Q 2 2 1 1	F-4
Q 2 2 1 2	F-5
Q 2 2 1 3	F-3
Q 2 2 1 4	F-3
Q 2 2 1 5	F-2
Q 2 2 1 6	F-2
Q 2 2 1 7	E-4
Q 2 2 1 8	F-4
Q 2 4 0 1	G-5
Q 2 4 0 2	H-3
Q 2 4 0 3	G-3
Q 2 4 0 5	G-5
Q 2 4 0 9	I-4
Q 2 4 1 0	I-4
Q 2 4 1 1	I-6
Q 2 4 1 2	I-3
Q 2 4 1 3	I-3
Q 2 4 1 4	J-3
Q 2 4 1 5	I-2
Q 2 4 1 6	H-2
Q 2 4 1 7	I-2
Q 2 4 1 8	H-2
Q 2 4 1 9	I-4
Q 2 4 2 0	I-2
Q 2 4 2 1	G-5

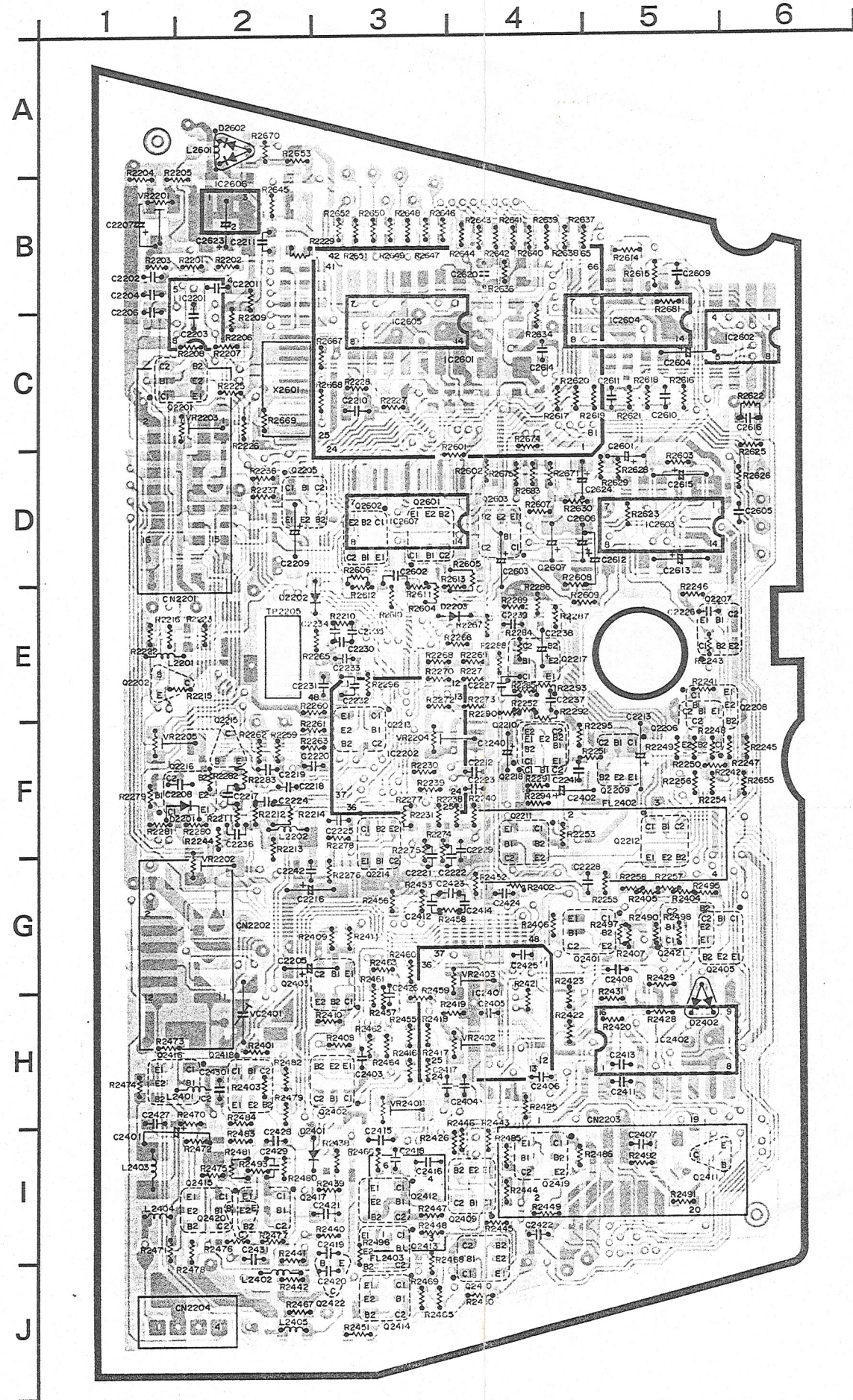
Q 2 4 2 2	J-3
Q 2 6 0 1	D-3
Q 2 6 0 2	D-3
Q 2 6 0 3	D-4
V C 2 4 0 1	H-2
V R 2 2 0 1	B-1
V R 2 2 0 2	G-2
V R 2 2 0 3	C-2
V R 2 2 0 4	F-3
V R 2 2 0 5	F-1
V R 2 4 0 1	H-3
V R 2 4 0 2	H-4
V R 2 4 0 3	G-4



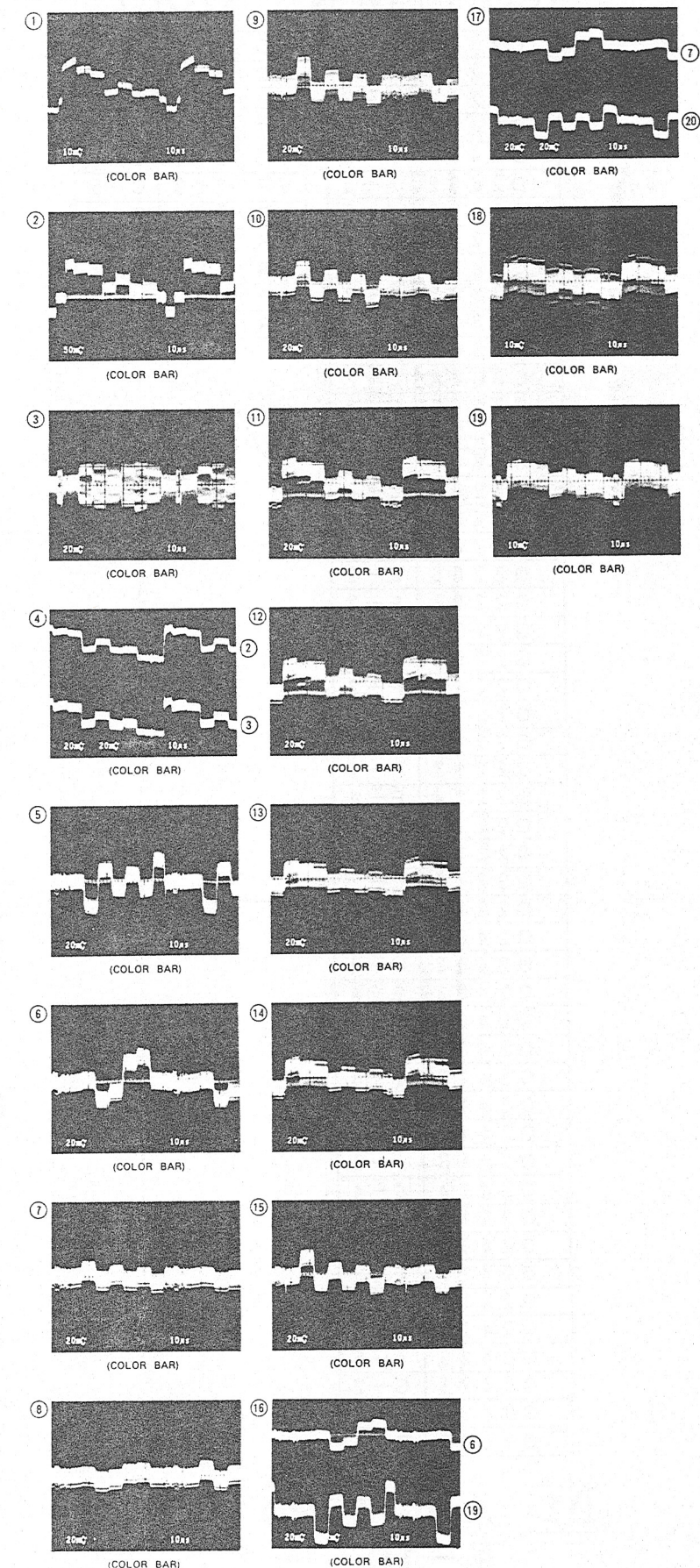


# PROCESS C.B.A. (SOLDERING SIDE)

D2201	F-2	Q2422	J-3
D2202	E-3	Q2601	D-3
D2203	E-4	Q2602	D-3
D2401	I-3	Q2603	D-4
D2402	H-5	VC2401	H-2
D2602	A-2	VR2201	B-1
IC2201	B-2	VR2202	G-2
IC2202	F-3	VR2203	C-2
IC2401	H-4	VR2204	F-3
IC2402	H-5	VR2205	F-1
IC2601	C-4	VR2401	H-3
IC2602	C-6	VR2402	H-4
IC2603	D-5	VR2403	G-4
IC2604	C-5		
IC2605	C-3		
IC2606	B-2		
IC2607	D-3		
Q2201	C-2		
Q2202	E-1		
Q2205	D-2		
Q2206	F-5		
Q2207	E-6		
Q2208	E-6		
Q2209	F-5		
Q2210	F-4		
Q2211	F-4		
Q2212	F-5		
Q2213	F-3		
Q2214	F-3		
Q2215	F-2		
Q2216	F-2		
Q2217	E-4		
Q2218	F-4		
Q2401	G-5		
Q2402	H-3		
Q2403	G-3		
Q2405	G-5		
Q2409	I-4		
Q2410	I-4		
Q2411	I-6		
Q2412	I-3		
Q2413	I-3		
Q2414	J-3		
Q2415	I-2		
Q2416	H-2		
Q2417	I-2		
Q2418	H-2		
Q2419	I-4		
Q2420	I-2		
Q2421	G-5		

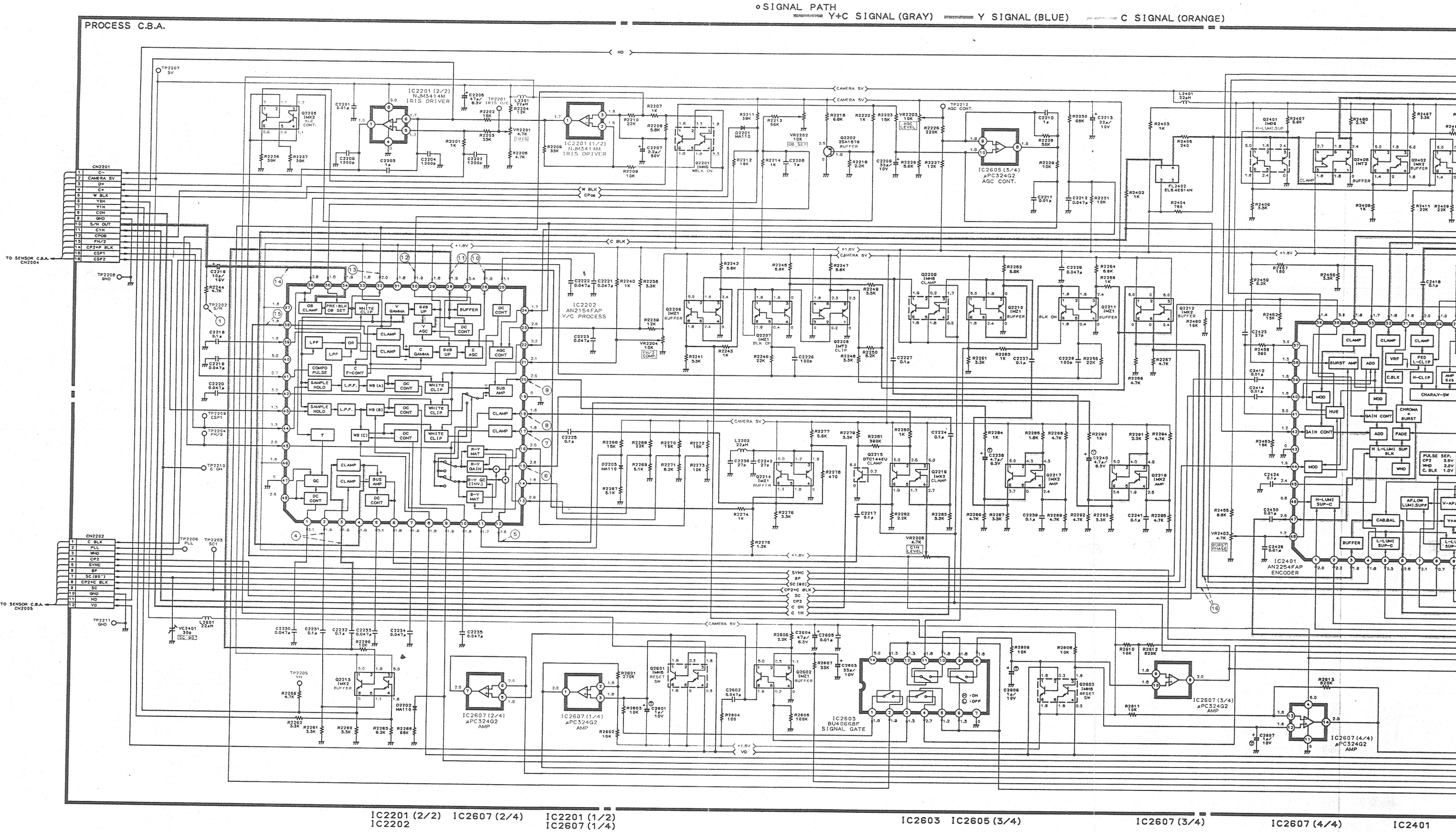


## SIGNAL WAVEFORMS



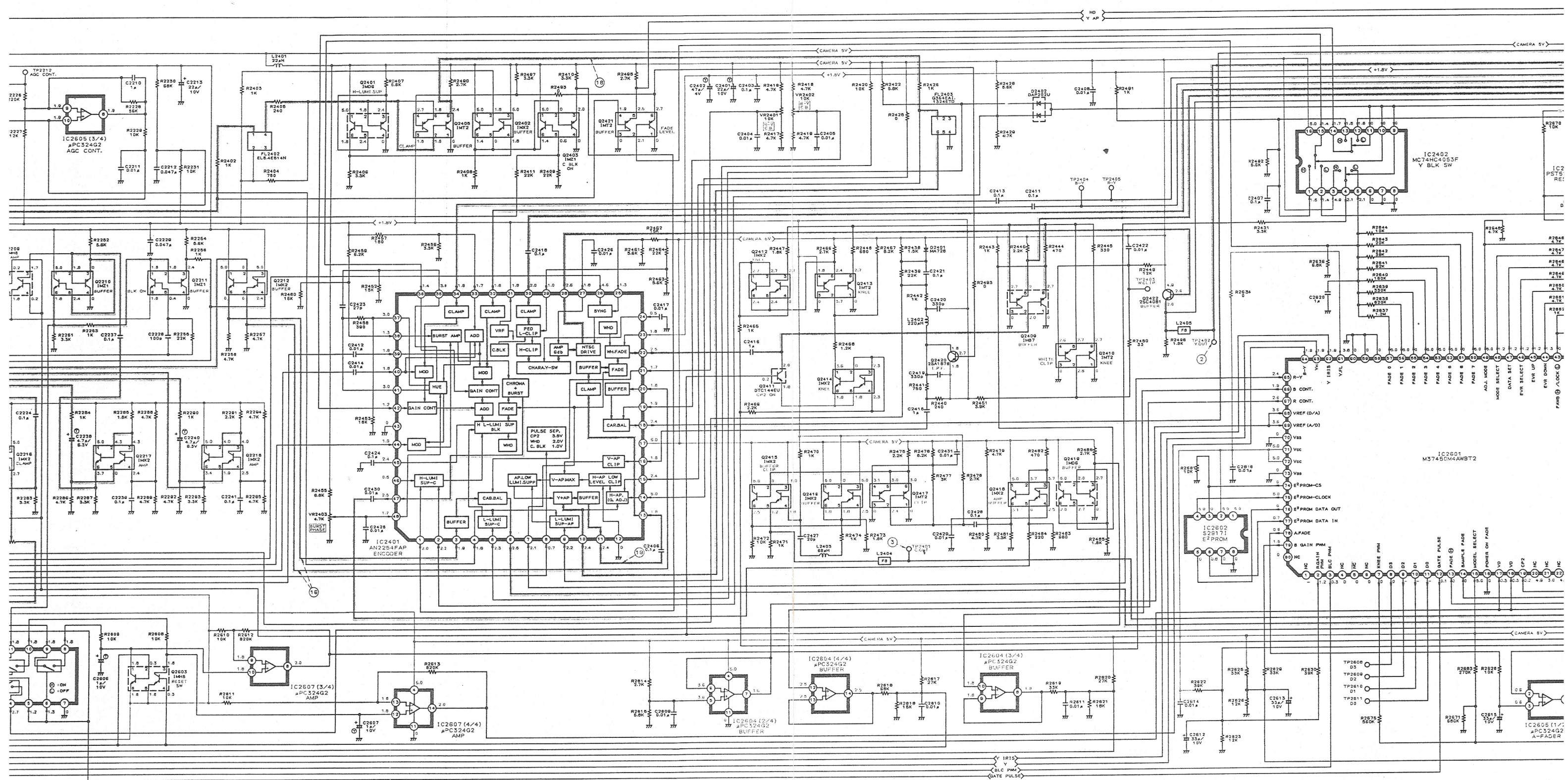


SCHEMATIC DIAGRAM PROCESS C.B.A.





Y SIGNAL (BLUE) C SIGNAL (ORANGE)



503 IC2605 (3/4) IC2607 (3/4) IC2607 (4/4) IC2401 IC2604 (2/4) IC2604 (4/4) IC2604 (3/4) IC2602 IC2402 IC2601 IC260





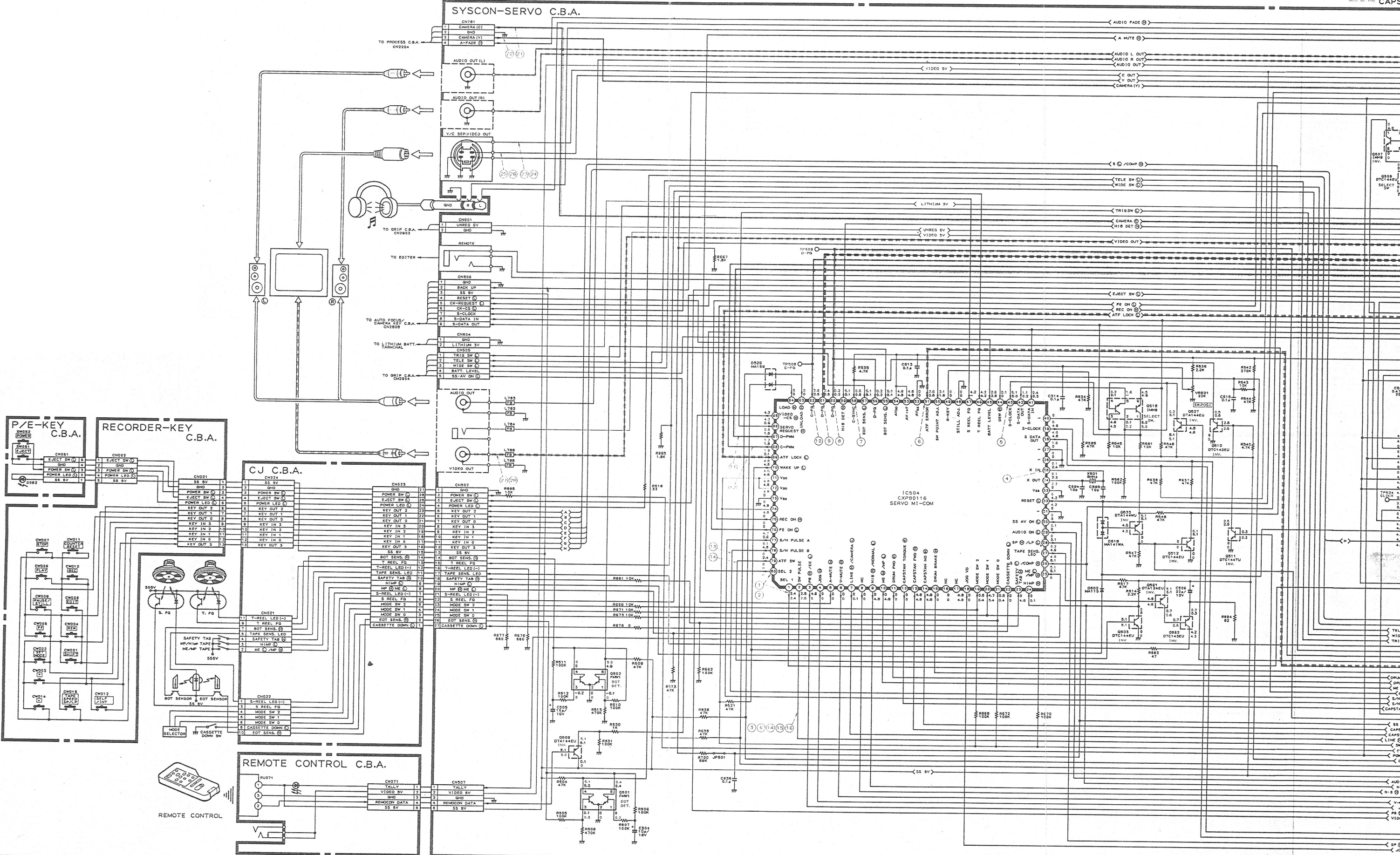




SCHEMATIC DIAGRAM SYSCON-SERVO C.B.A.

SIGNAL PATH

CAPS  
CAPS  
CAPS





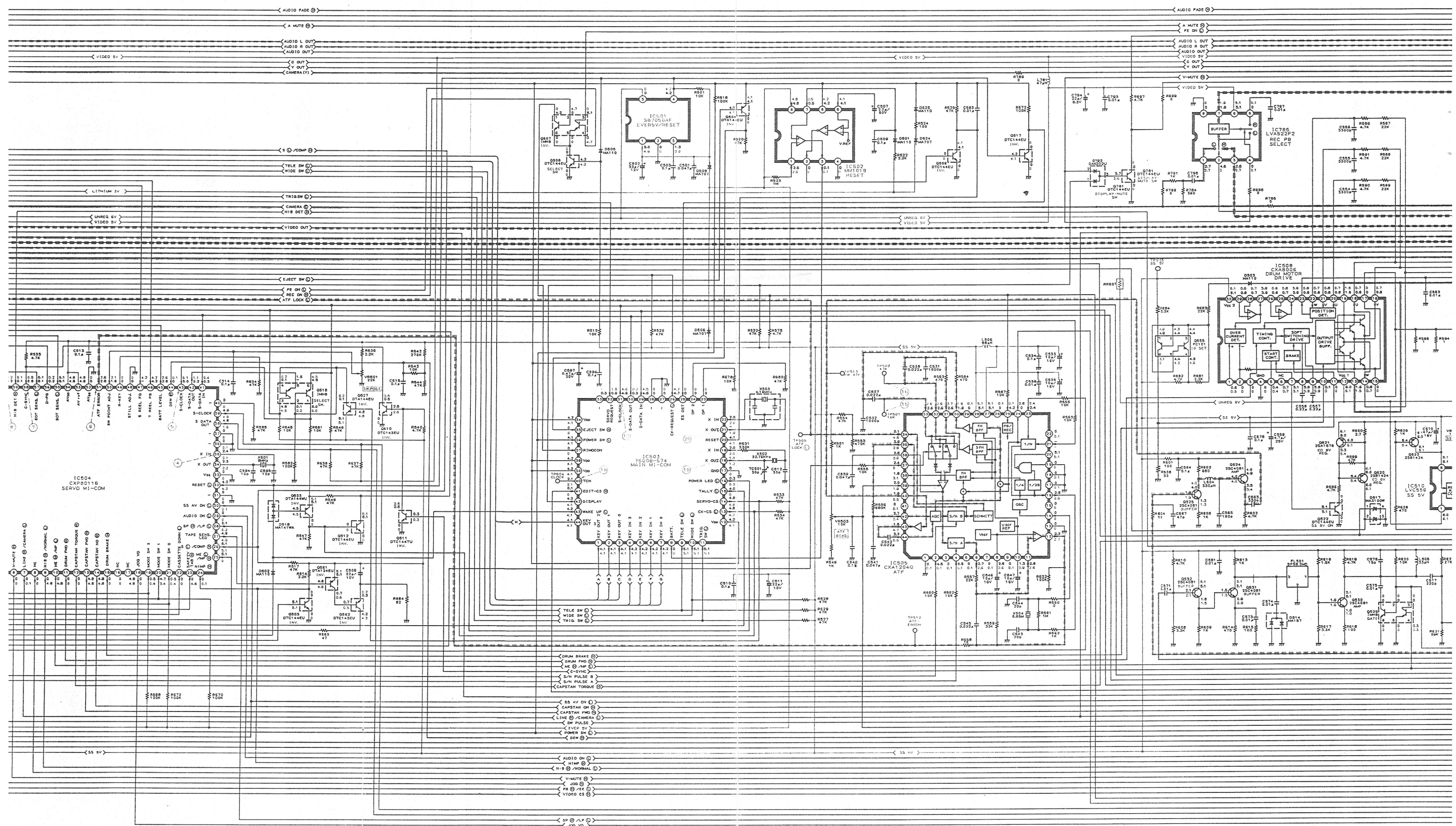
•SIGNAL PATH

==== CAPSTAN PWM (ORANGE)  
==== CAPSTAN ATF (ORANGE)  
==== CAPSTAN FG (ORANGE)  
==== DRUM PWM (BLUE)  
==== DRUM FG (BLUE)  
==== DRUM PG (BLUE)

==== PB Y+C SIGNAL (GRAY)

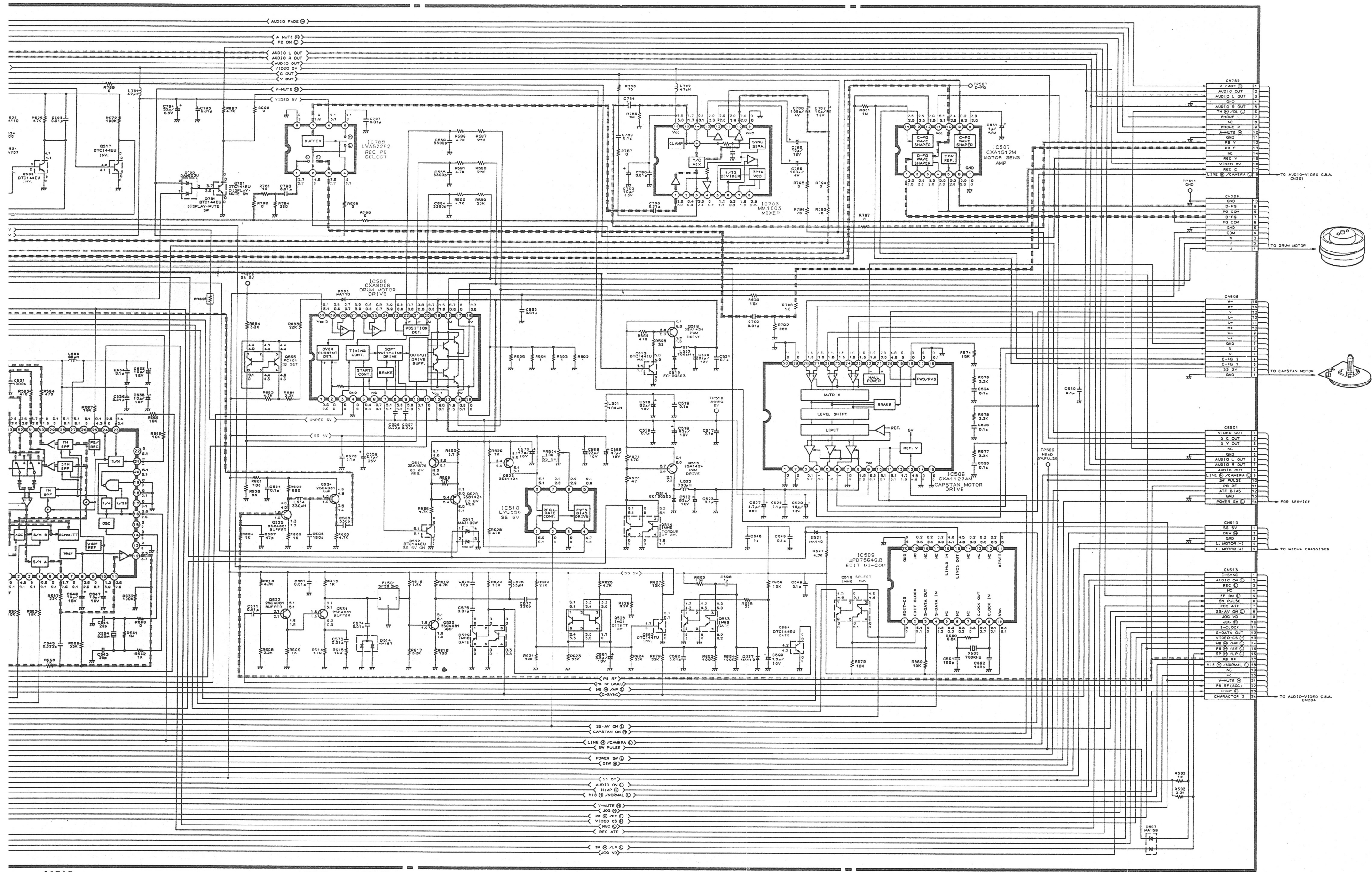
==== REC Y SIGNAL (ORANGE)  
==== REC Y SIGNAL (ORANGE)  
==== REC C SIGNAL (BLUE)  
==== REC C SIGNAL (BLUE)

==== PB AUDIO SIGNAL (RED)





Y) REC Y SIGNAL (ORANGE) REC C SIGNAL (BLUE) PB AUDIO SIGNAL (RED)  
 PB Y SIGNAL (ORANGE) PB C SIGNAL (BLUE)



IC505

IC785

IC508

IC510

IC783

IC506

IC507 IC509



# CIRCUIT BOARD DIAGRAM AUDIO-VIDEO C.B.A.

## AUDIO-VIDEO C.B.A. (COMPONENT SIDE)

### < NOTICES >

Audio-Video C. B. A. consists of four layers.

(Soldering, Component, Power Supply and Ground patterns.)

※ Through-hole marks on each C. B. A. denote :

○ : Soldering side ↔ Component side

⊙ : Soldering side (Component side) ↔ Ground

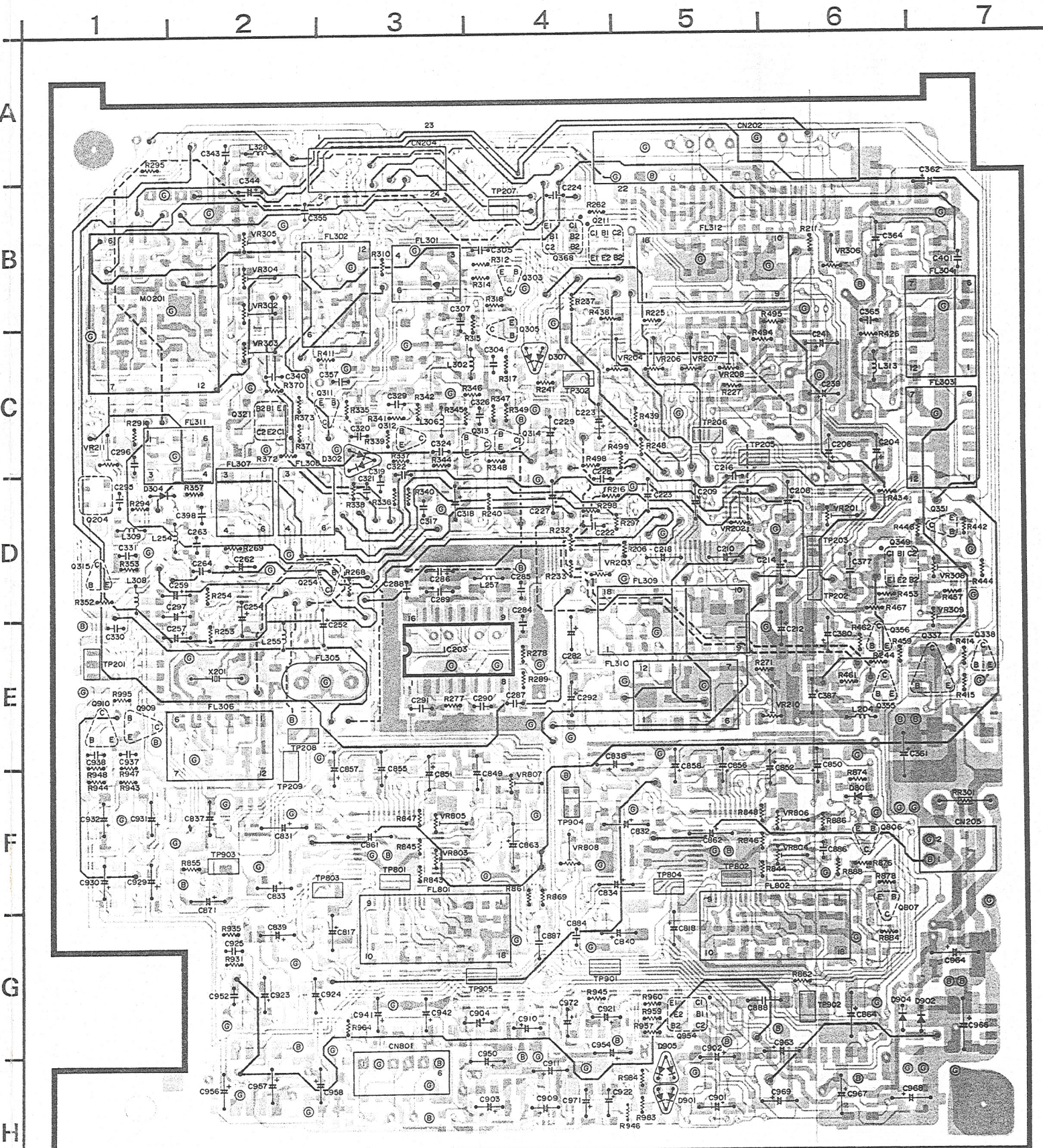
⊕ : Soldering side (Component side) ↔ Power Supply

And, blue lines denote signal patterns which connected in the Ground or Power Supply layer.

Blue (——) : Power Supply layer

D302	C-3
D304	D-1
D307	C-4
D801	F-6
D901	H-5
D902	G-7
D904	G-6
D905	H-5
IC203	E-3
Q211	B-4
Q254	D-3
Q303	B-4
Q305	C-4
Q311	C-3
Q312	C-3
Q313	C-4
Q314	C-4
Q315	D-1
Q321	C-2
Q337	E-7
Q338	E-7
Q349	D-6
Q355	E-6
Q356	E-6
Q368	B-4
Q806	F-6
Q909	E-1
Q910	E-1
Q954	G-5
TP201	E-1
TP202	D-6
TP203	D-6
TP205	C-5
TP206	C-5
TP207	B-4
TP208	E-2
TP209	E-2
TP302	C-4
TP801	F-3
TP802	F-5
TP803	F-3
TP804	F-5
TP807	F-4
TP901	G-4
TP902	G-6
TP903	F-2
TP904	F-4
TP905	G-4
VR201	D-6
VR202	D-5
VR203	D-4
VR204	C-5
VR206	C-5
VR207	C-5
VR208	C-5

VR210	E-6
VR211	C-1
VR302	B-2
VR303	C-2
VR304	B-2
VR305	B-2
VR306	B-6
VR308	D-7
VR309	E-7
VR803	F-3
VR804	F-6
VR805	F-3
VR806	F-6
VR807	F-4
VR808	F-4

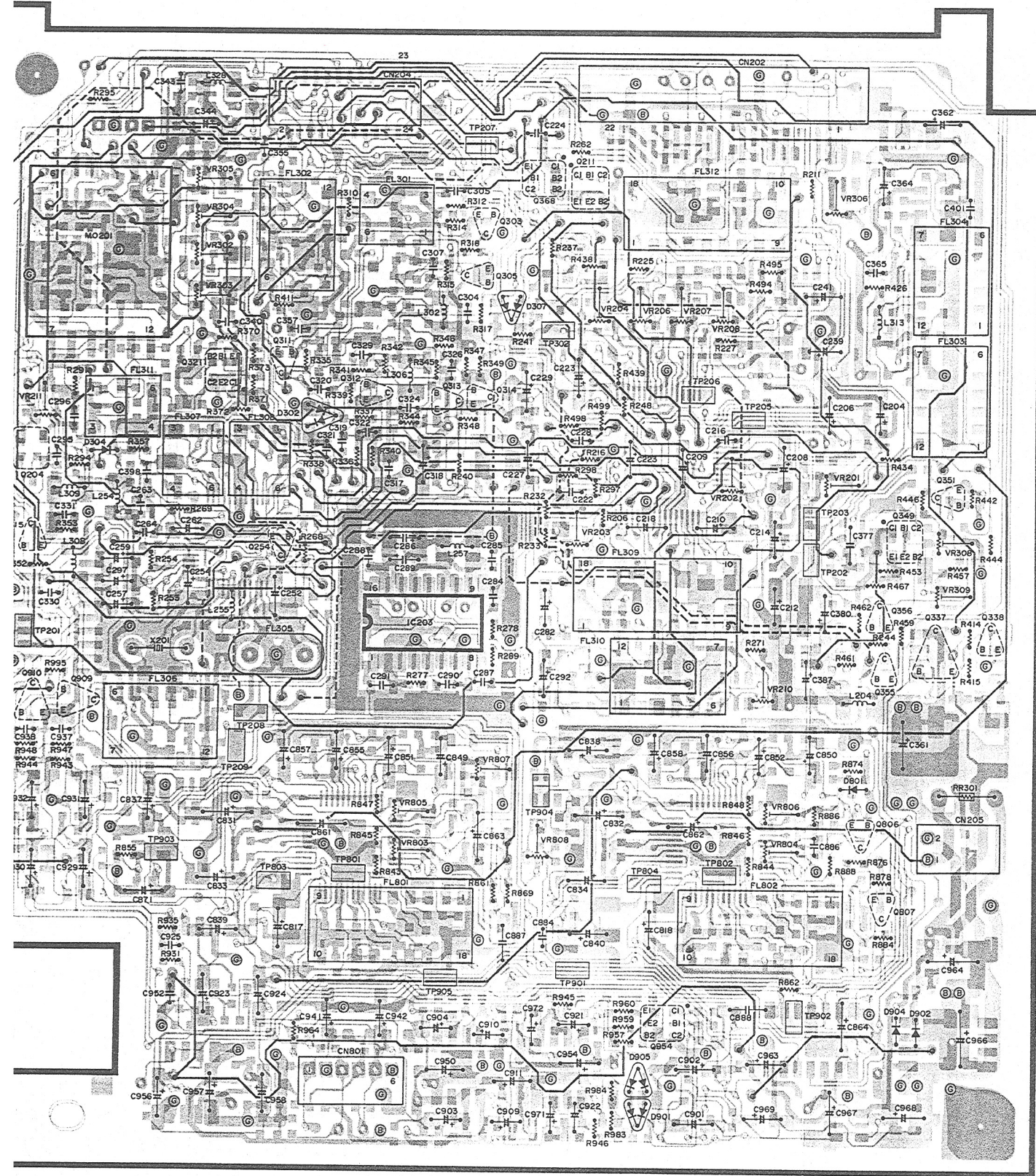




1 2 3 4 5 6 7

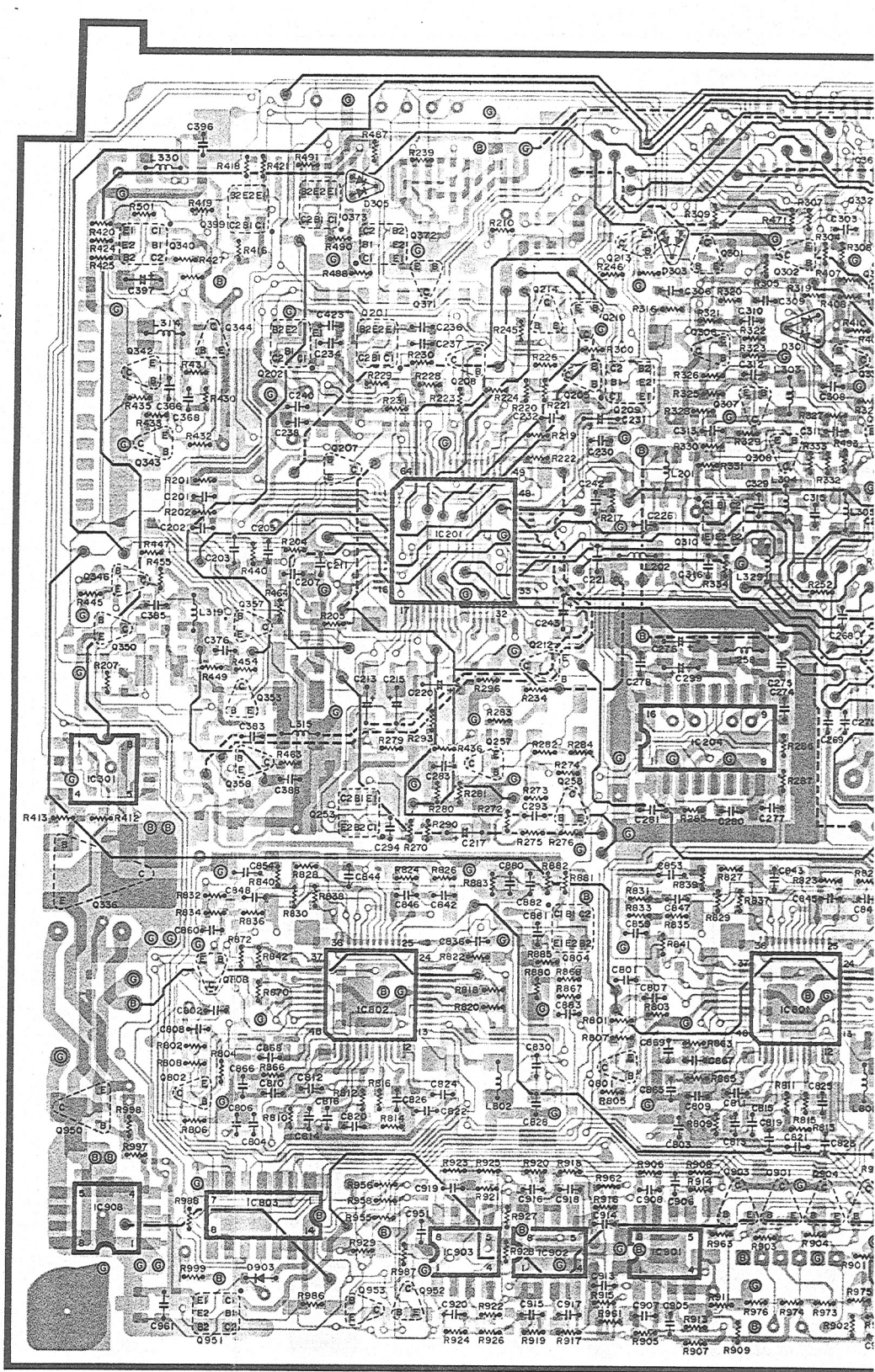
AUDIO-VIDEO C.B.A.  
(SOLDERING SIDE)

1 2 3 4 5



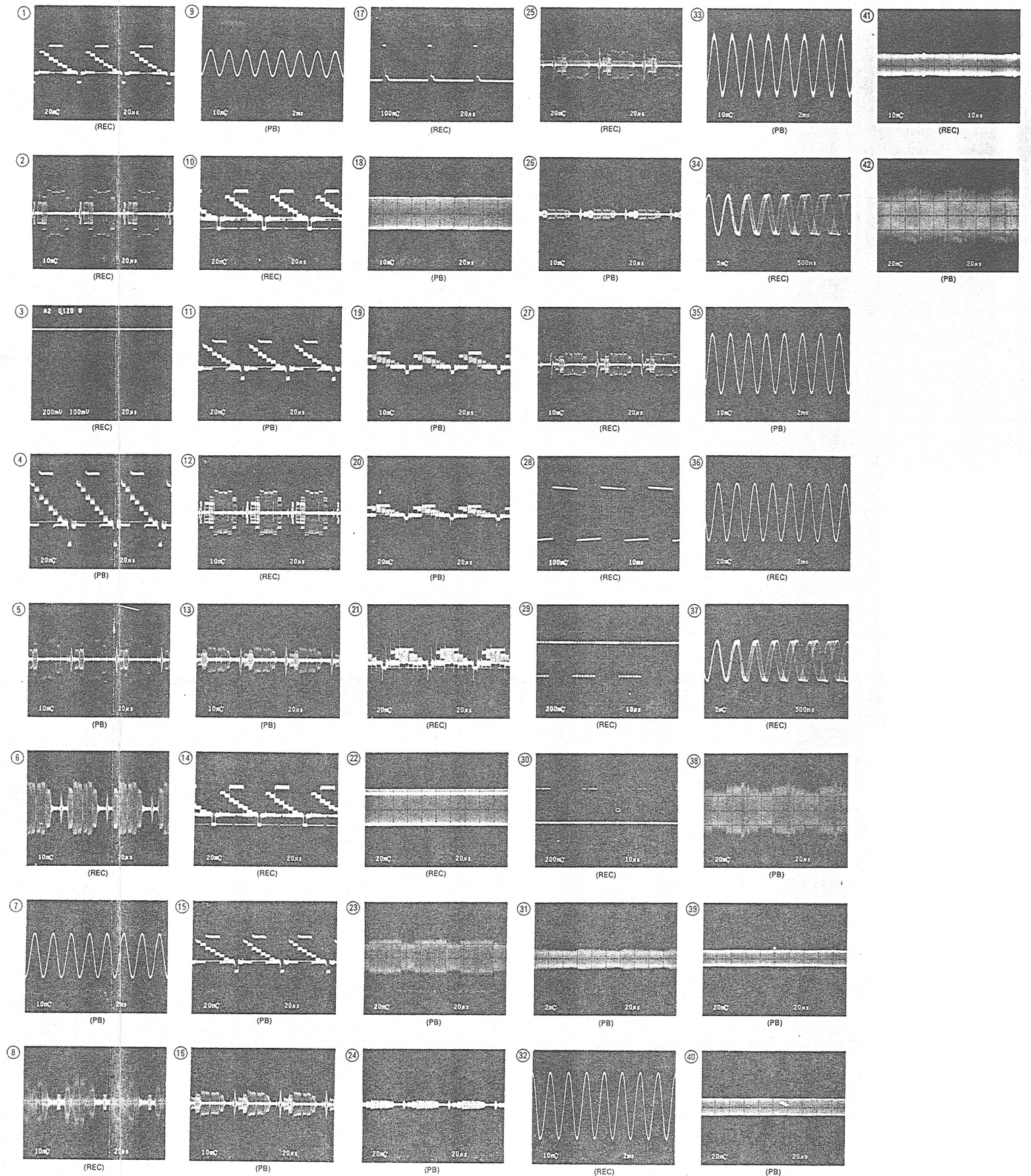
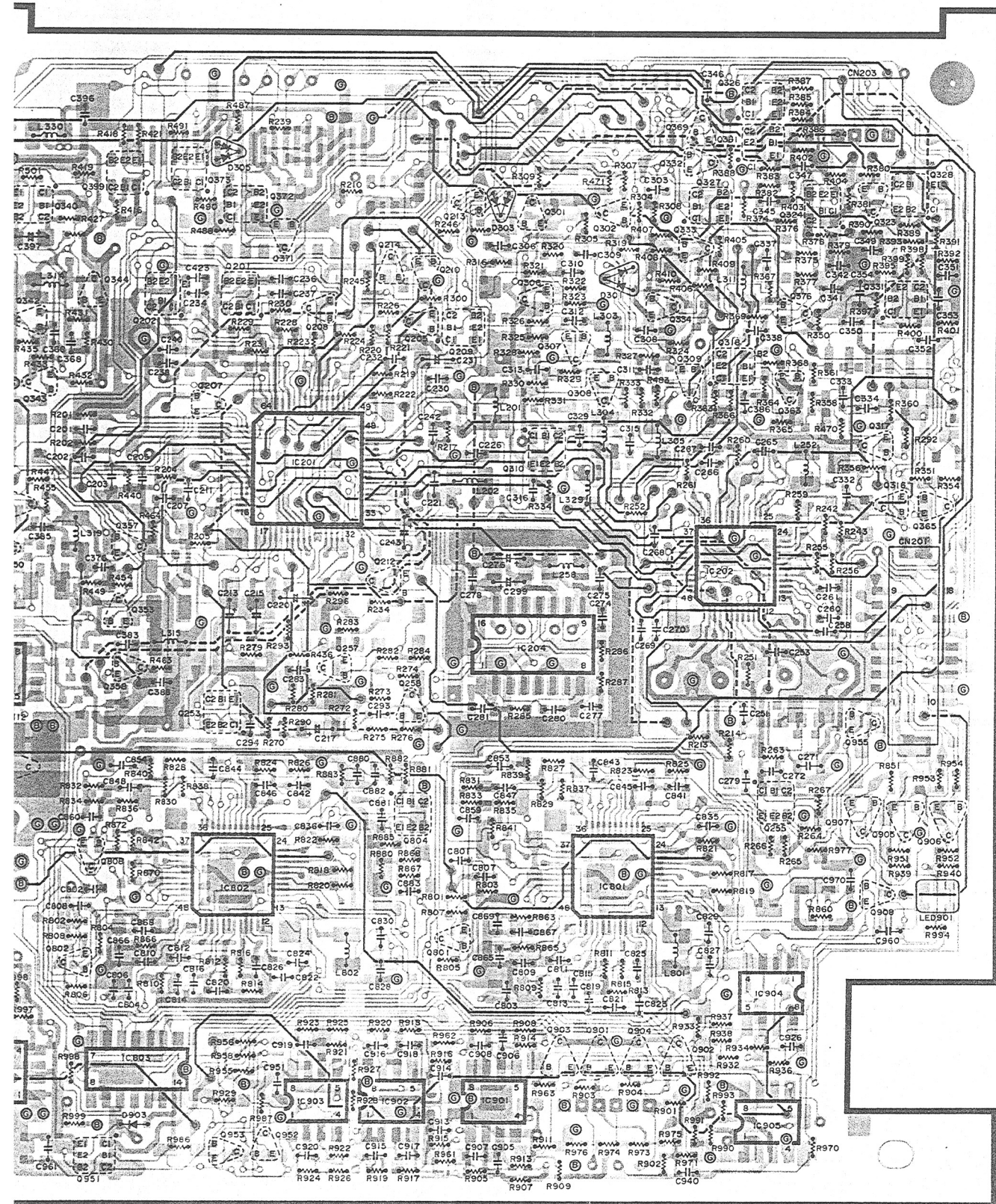
D301	B-5	Q346	D-1
D303	B-4	Q350	D-1
D305	B-3	Q353	D-2
D903	H-2	Q357	D-2
IC201	D-3	Q358	E-2
IC202	D-6	Q361	B-6
IC204	E-4	Q363	C-6
IC301	E-1	Q365	D-7
IC801	F-5	Q369	B-5
IC802	F-3	Q371	B-3
IC803	G-2	Q372	B-3
IC901	H-4	Q373	B-2
IC902	H-4	Q376	C-6
IC903	H-3	Q399	B-2
IC904	G-6	Q801	G-4
IC905	H-6	Q802	G-2
IC908	G-1	Q804	F-4
Q201	C-3	Q808	F-2
Q202	C-2	Q901	G-5
Q205	C-4	Q902	G-5
Q207	C-2	Q903	G-5
Q208	C-3	Q904	G-5
Q209	C-4	Q905	F-7
Q210	B-4	Q906	F-7
Q212	E-4	Q907	F-6
Q213	B-4	Q908	F-7
Q214	C-4	Q950	G-1
Q253	E-3	Q951	H-2
Q255	F-6	Q952	H-3
Q257	E-3	Q953	H-3
Q258	E-4	Q955	E-6
Q301	B-4		
Q302	B-5		
Q306	C-4		
Q307	C-5		
Q308	C-5		
Q309	C-5		
Q310	C-4		
Q316	D-7		
Q317	C-7		
Q318	C-6		
Q323	B-6		
Q324	B-6		
Q326	A-6		
Q327	B-6		
Q328	B-4		
Q331	C-7		
Q332	B-5		
Q333	B-5		
Q334	C-5		
Q336	E-1		
Q340	B-1		
Q342	C-1		
Q343	C-1		
Q344	C-2		

A  
B  
C  
D  
E  
F  
G  
H



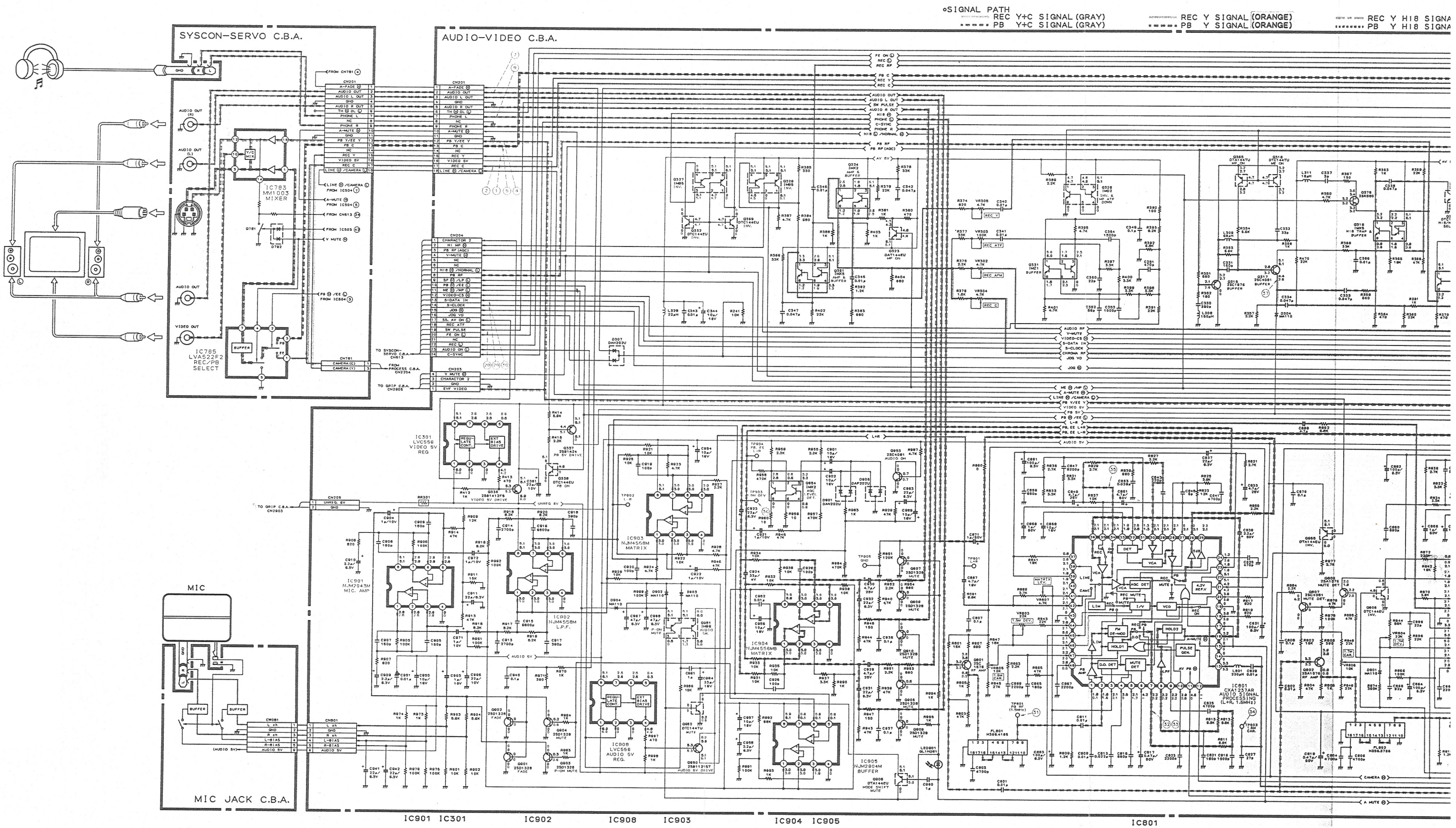


# SIGNAL WAVEFORMS





## SCHEMATIC DIAGRAM AUDIO-VIDEO C.B.A.





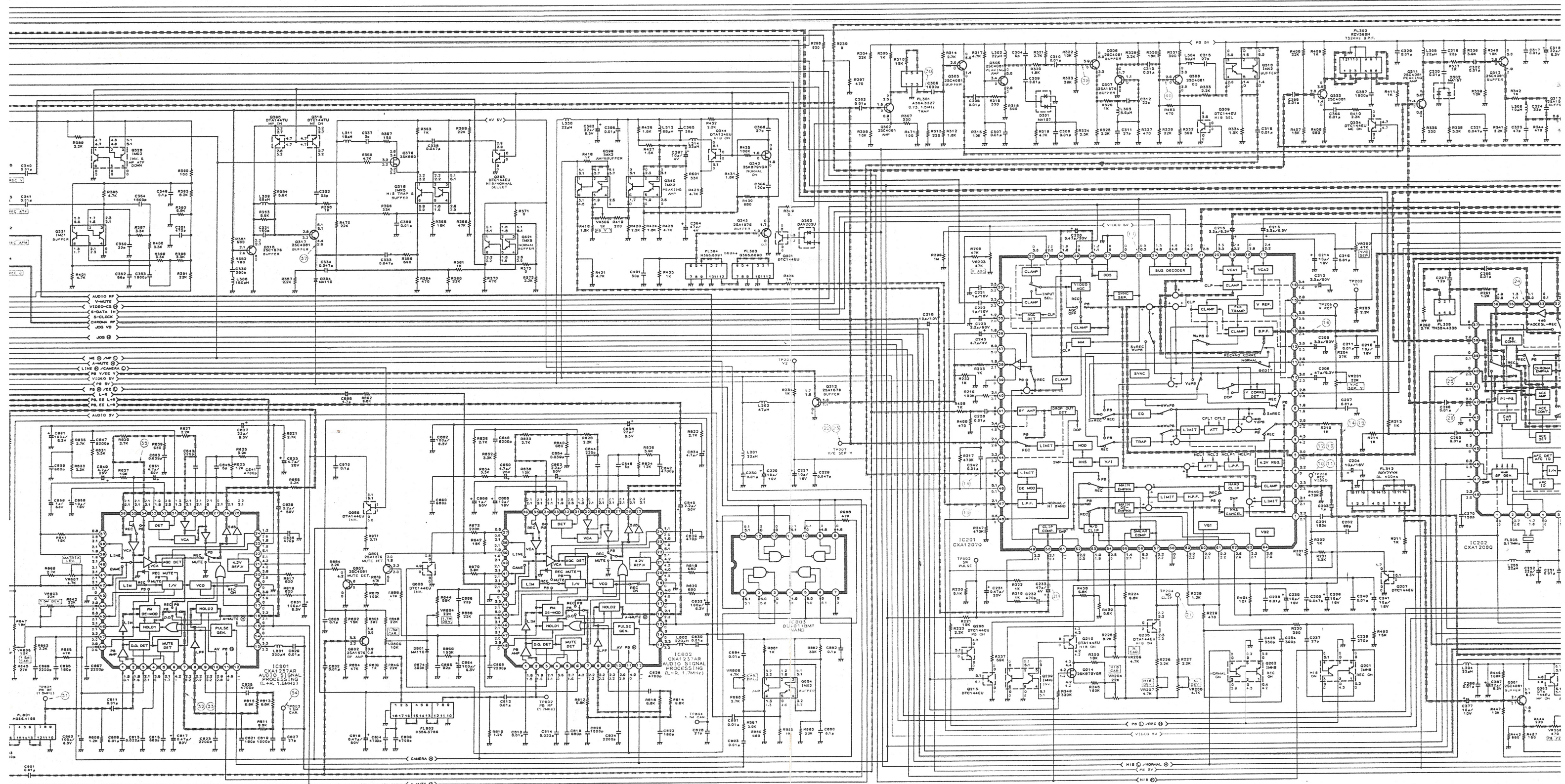
PATH  
 REC Y+C SIGNAL (GRAY)  
 PB Y+C SIGNAL (GRAY)

REC Y SIGNAL (ORANGE)  
 PB Y SIGNAL (ORANGE)

REC Y H1B SIGNAL (ORANGE)  
 PB Y H1B SIGNAL (ORANGE)

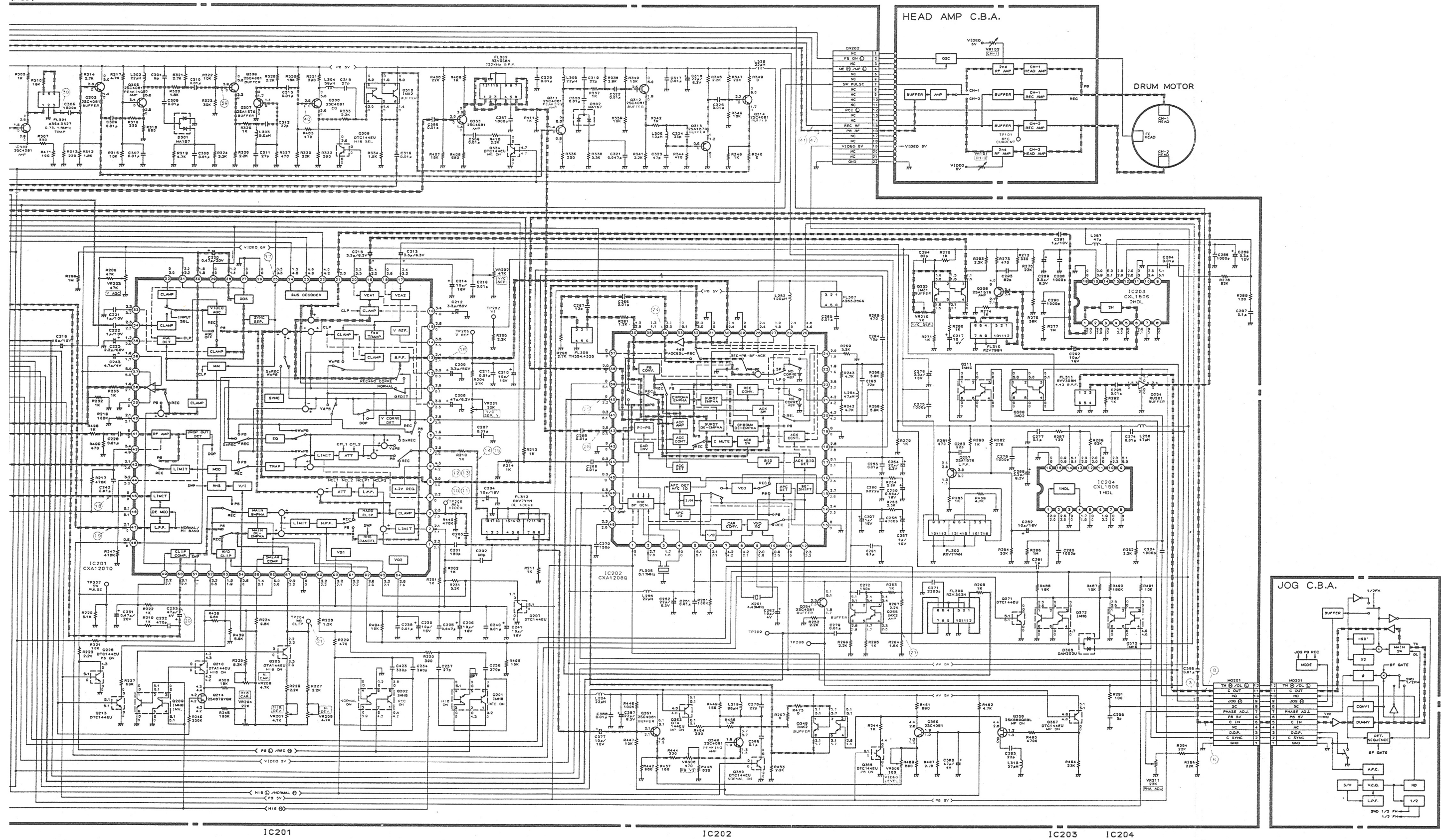
REC C SIGNAL (BLUE)  
 PB C SIGNAL (BLUE)

REC A SIGNAL (RED)  
 PB A SIGNAL (RED)





(RED)  
(RED)

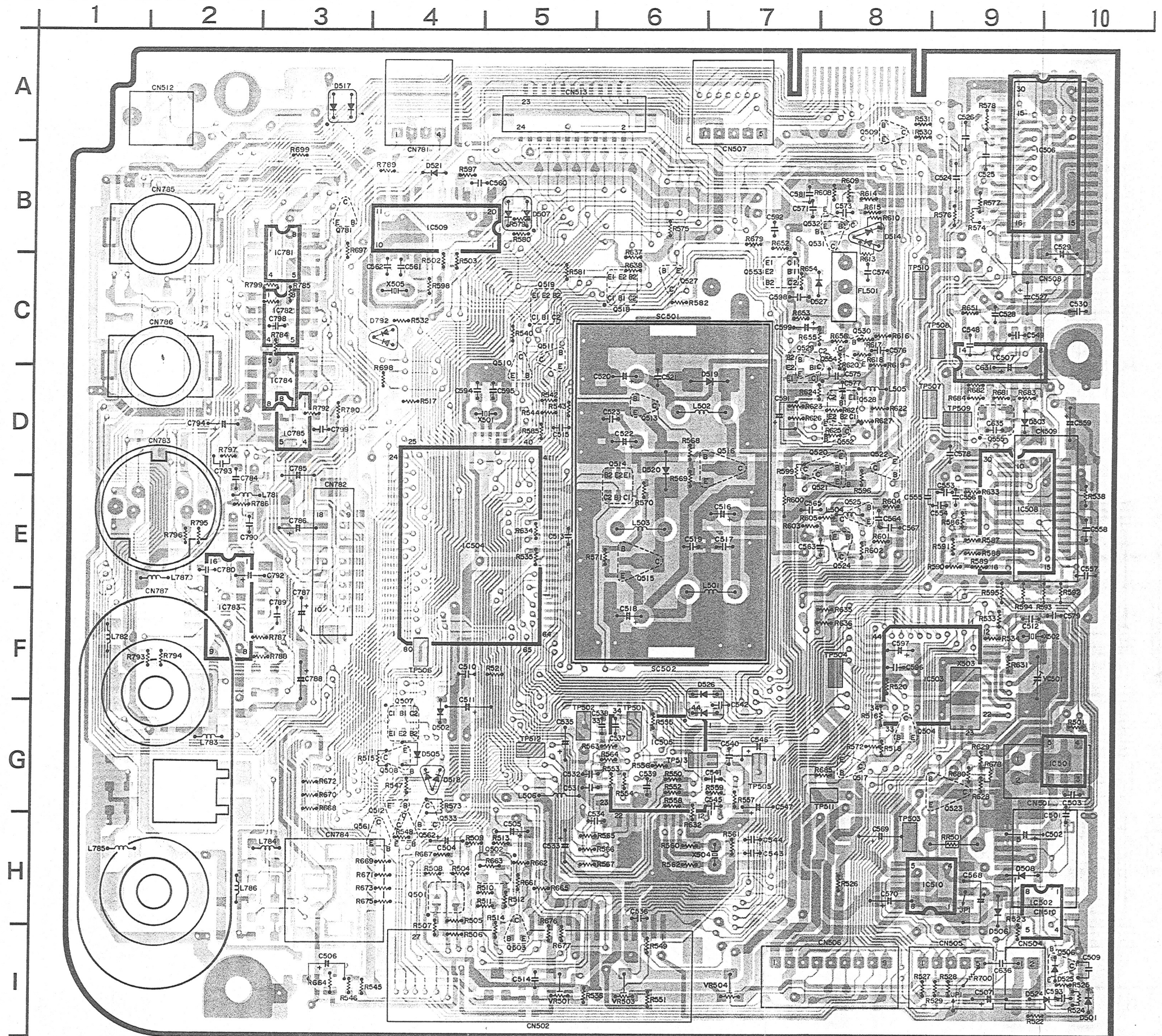




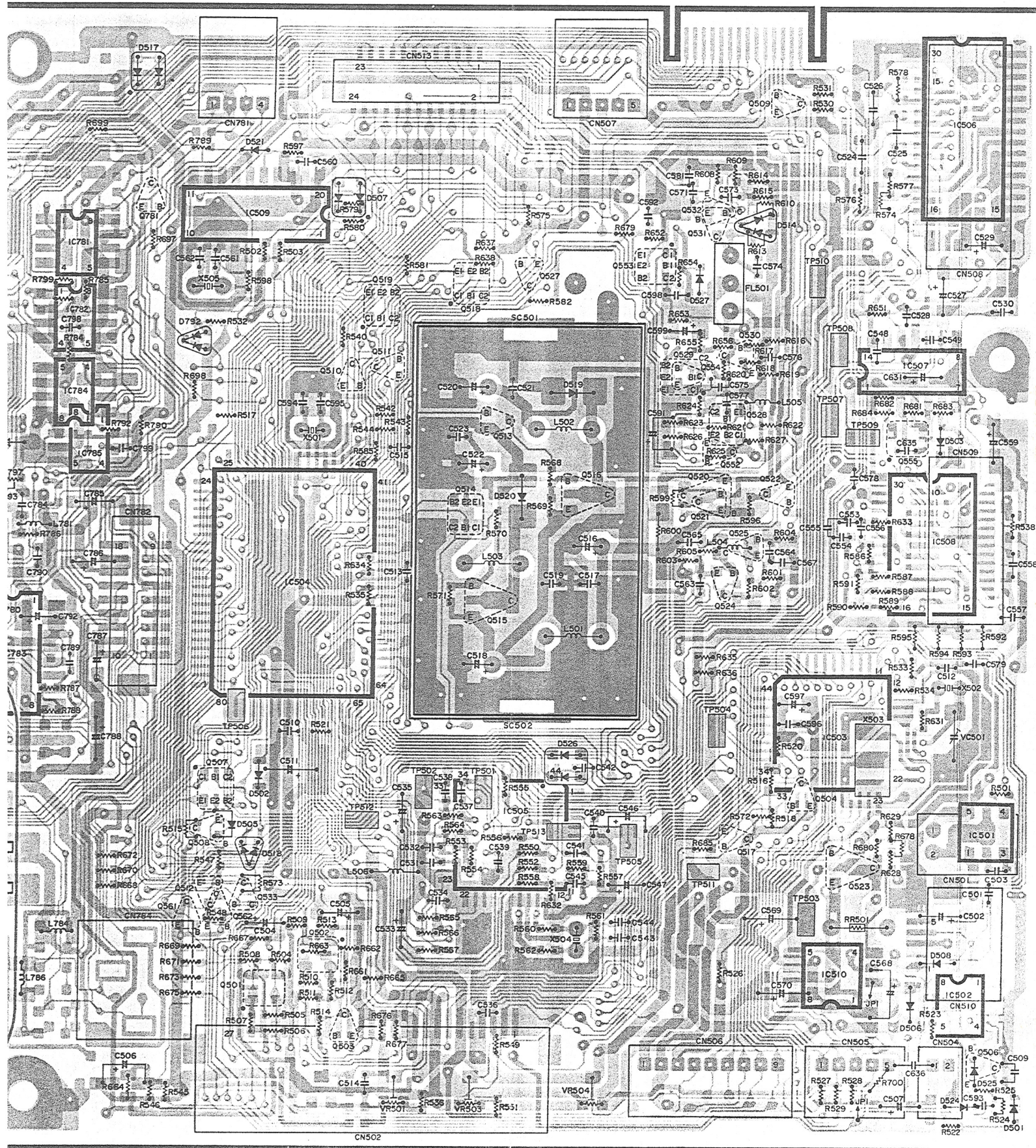
# CIRCUIT BOARD DIAGRAM SYSCON-SERVO C.B.A.

## SYSCON-SERVO C.B.A.

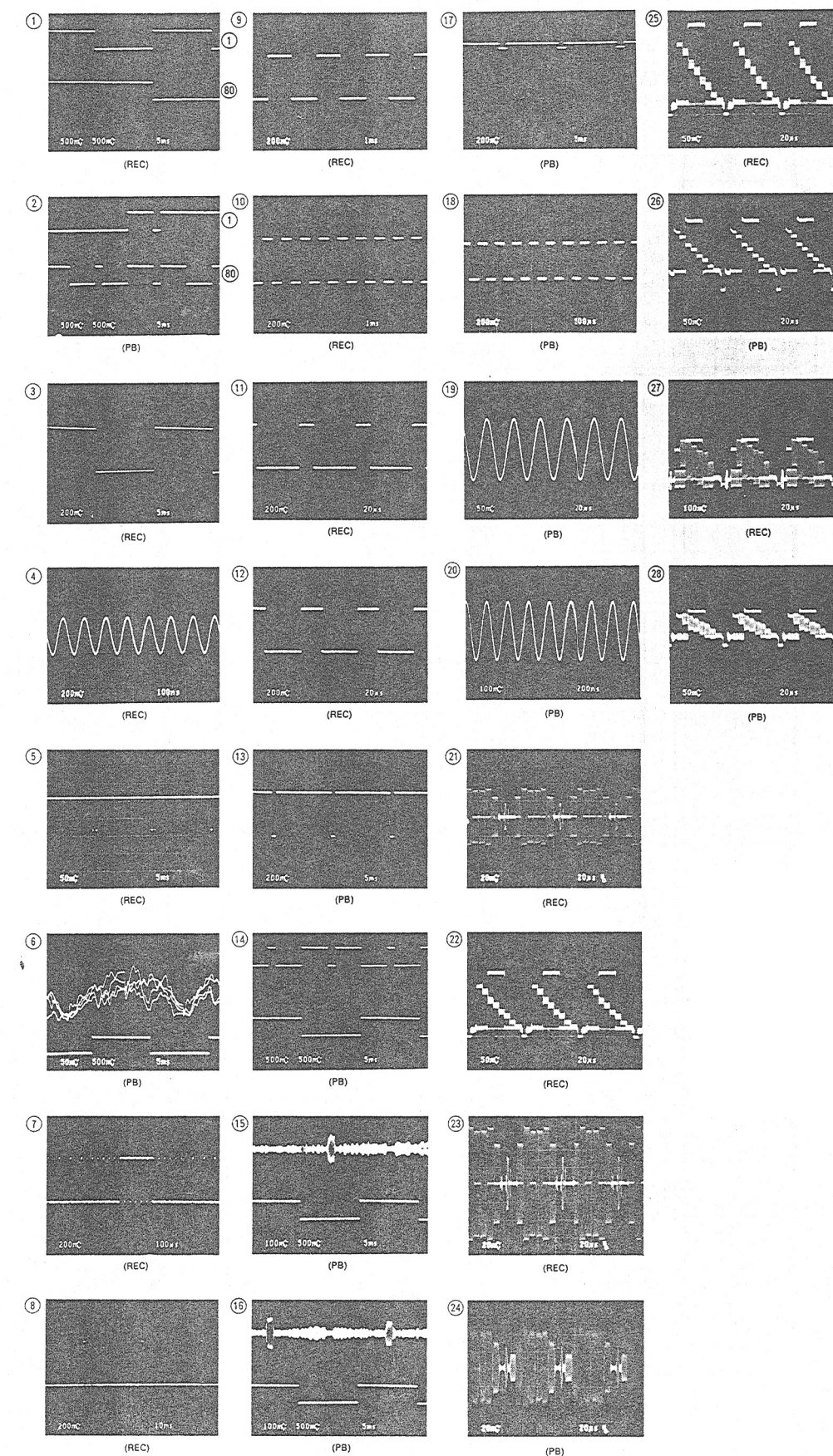
D501	I-10	Q525	E-8
D502	G-4	Q527	C-6
D503	D-9	Q528	D-8
D505	G-4	Q529	C-7
D506	H-9	Q530	C-8
D507	B-5	Q531	B-8
D508	H-9	Q532	B-8
D514	B-8	Q533	H-4
D517	A-3	Q552	D-8
D518	G-4	Q553	C-7
D519	D-7	Q554	D-7
D520	D-6	Q555	D-9
D521	B-4	Q561	H-4
D524	I-10	Q562	H-4
D525	I-10	Q781	B-3
D526	G-7	VC501	F-9
D527	C-8	VR501	I-5
D792	C-4	VR503	I-6
IC501	G-10	VR504	I-7
IC502	H-10	TP501	G-6
IC503	F-9	TP502	G-5
IC504	E-4	TP503	H-8
IC505	G-6	TP504	F-8
IC506	B-10	TP505	G-7
IC507	C-9	TP506	F-4
IC508	E-9	TP507	D-8
IC509	B-4	TP508	C-9
IC510	H-9	TP509	D-9
IC783	F-2	TP510	C-8
IC785	D-3	TP511	G-8
Q501	H-4	TP512	G-5
Q502	H-5	TP513	G-7
Q503	I-5		
Q504	G-8		
Q506	I-10		
Q507	G-4		
Q508	G-4		
Q509	A-8		
Q510	C-5		
Q511	C-5		
Q512	G-4		
Q513	D-6		
Q514	E-6		
Q515	E-6		
Q516	D-7		
Q517	G-8		
Q518	C-6		
Q519	C-5		
Q520	D-8		
Q521	D-8		
Q522	D-8		
Q523	G-9		
Q524	E-8		







## SIGNAL WAVEFORMS



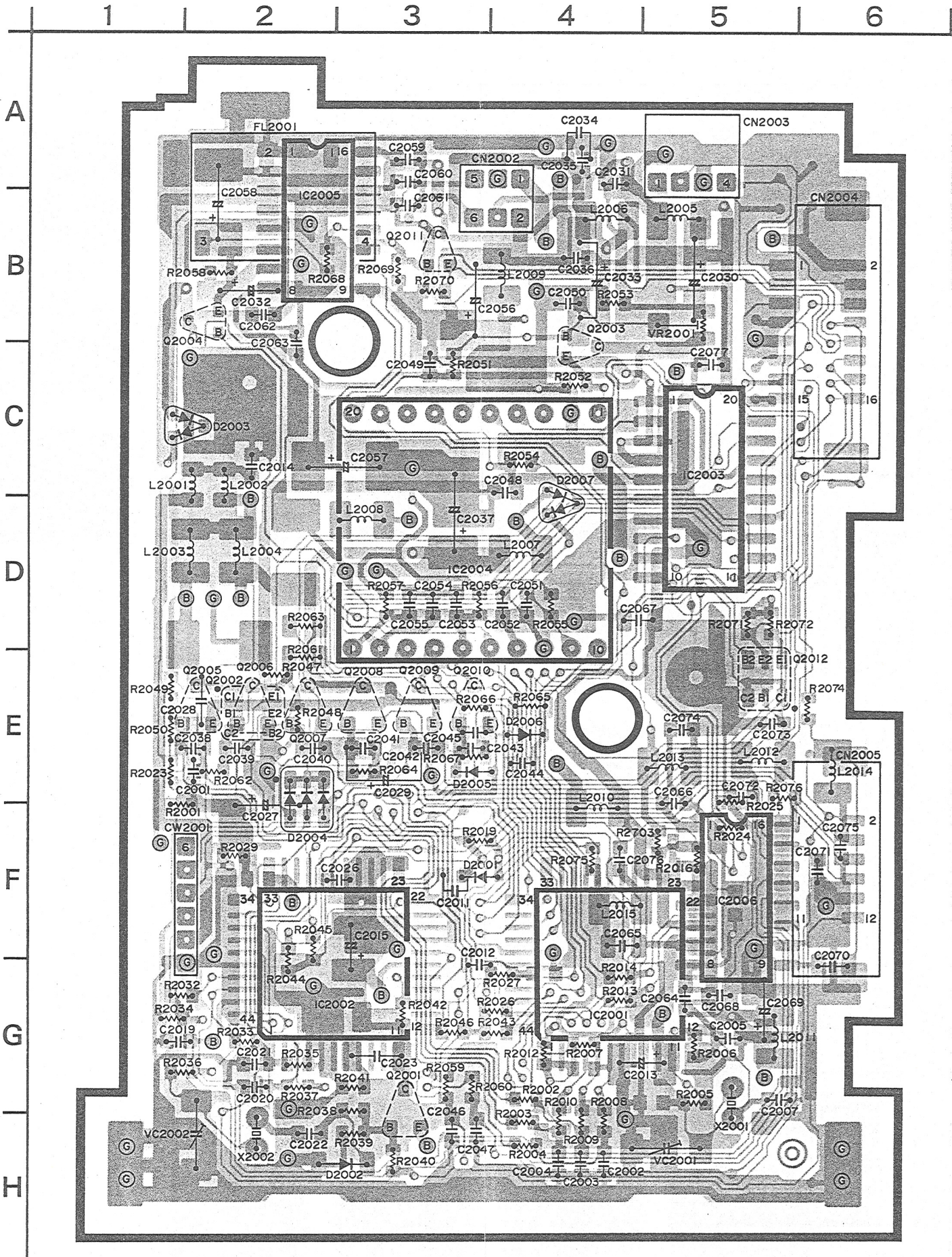


CIRCUIT BOARD DIAGRAM SENSOR C.B.A.

SENSOR C.B.A.

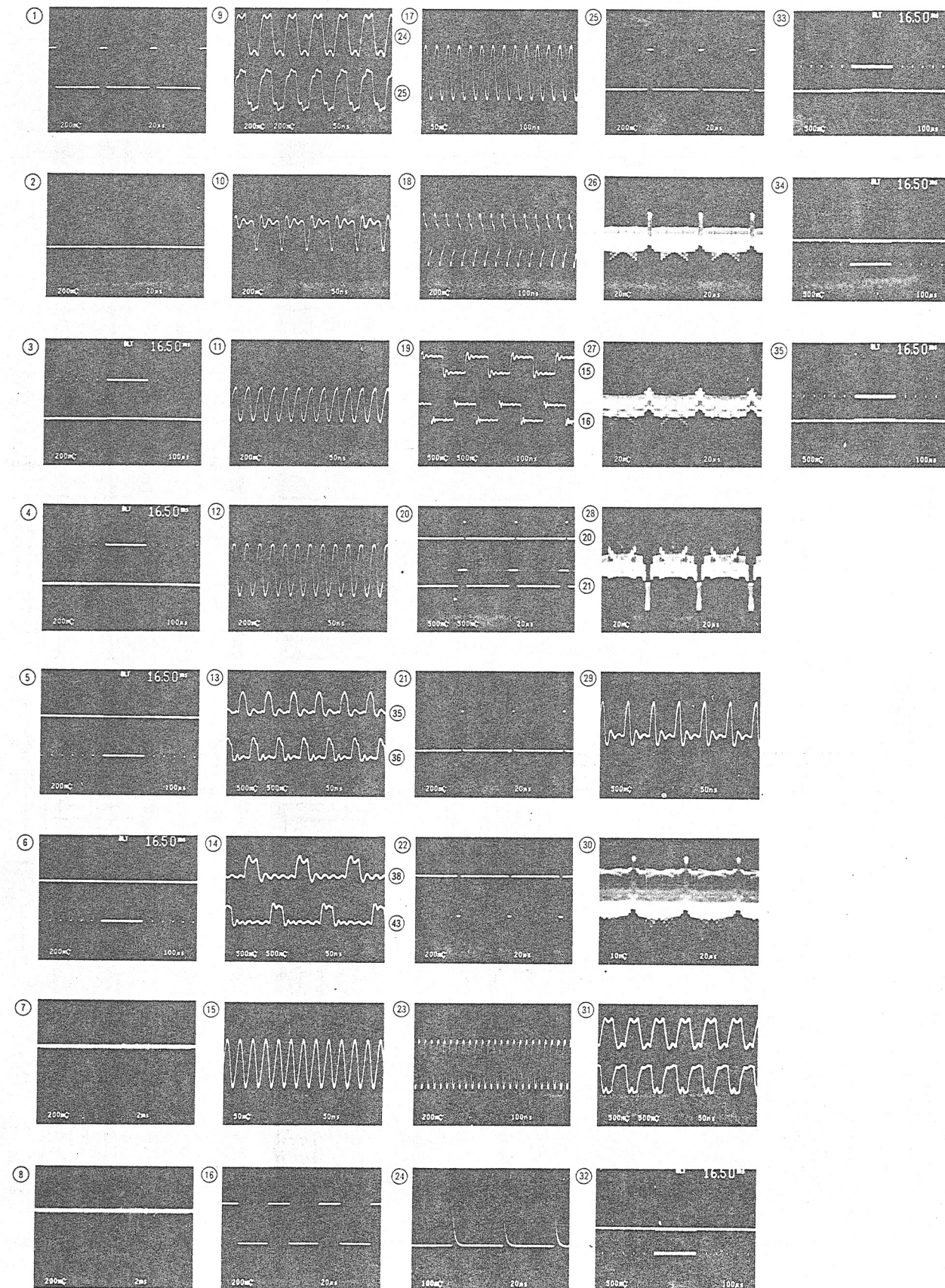
- < NOTICES >
- Sensor C. B. A. consists of four layers.  
(Soldering, Component, Ground and Camera 5V patterns.)
- ※ Through-hole marks on each C. B. A. denote :
- : Soldering side ↔ Component side
  - ⊙ : Soldering side (Component side) ↔ Ground
  - ⊕ : Soldering side (Component side) ↔ Camera 5V

D 2 0 0 1	F - 3
D 2 0 0 2	H - 3
D 2 0 0 3	C - 2
D 2 0 0 4	F - 2
D 2 0 0 5	E - 3
D 2 0 0 6	E - 4
D 2 0 0 7	C - 4
I C 2 0 0 1	G - 4
I C 2 0 0 2	G - 2
I C 2 0 0 3	C - 5
I C 2 0 0 4	D - 3
I C 2 0 0 5	B - 2
I C 2 0 0 6	F - 5
Q 2 0 0 1	G - 3
Q 2 0 0 2	E - 2
Q 2 0 0 3	B - 4
Q 2 0 0 4	B - 2
Q 2 0 0 5	E - 2
Q 2 0 0 6	E - 2
Q 2 0 0 7	E - 2
Q 2 0 0 8	E - 3
Q 2 0 0 9	E - 3
Q 2 0 1 0	E - 3
Q 2 0 1 1	B - 3
Q 2 0 1 2	E - 5
V C 2 0 0 1	H - 5
V C 2 0 0 2	H - 2
V R 2 0 0 1	B - 5





# SIGNAL WAVEFORMS



Canovision 8

# SERVICE MANUAL

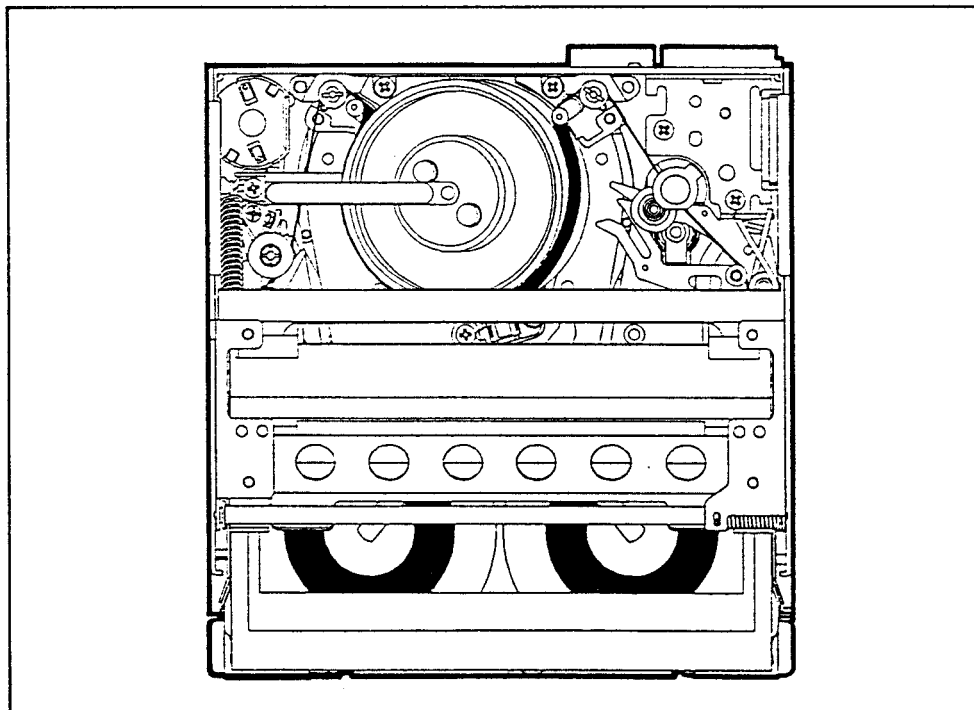
## MC-4B

MECHANICAL CHASSIS

NTSC

PAL

SECAM



DY8-3391-501-201

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Video Technical Service Dept.  
First Edition: Dec. 1988  
Printed in Japan

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# Chapter 1 Operations

## 1.Main Parts in Mechanical Section

### 1-1 Locations and Nomenclatures

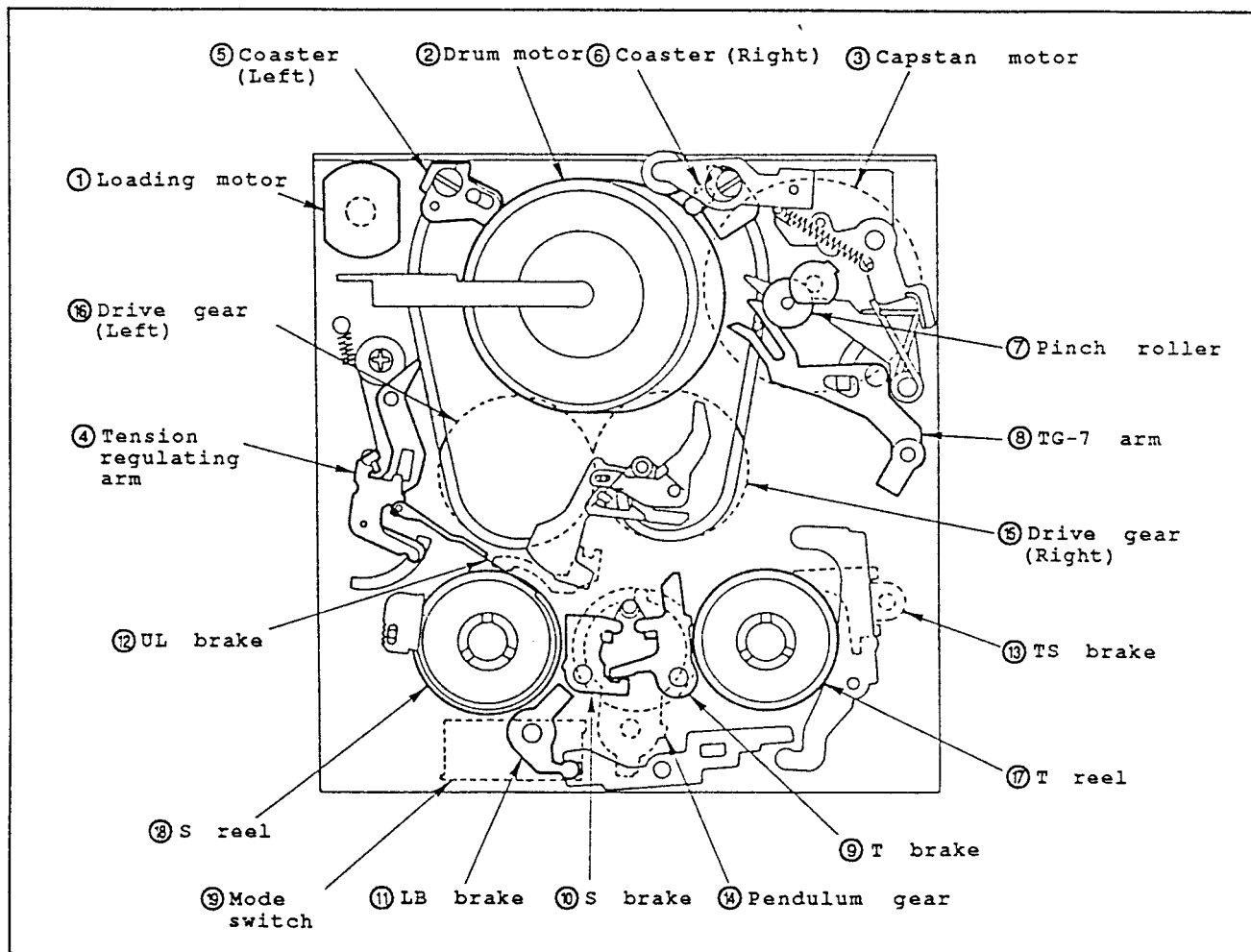


Fig.I-1

### 1-2 Relationships between Each Mode and Mode Switch

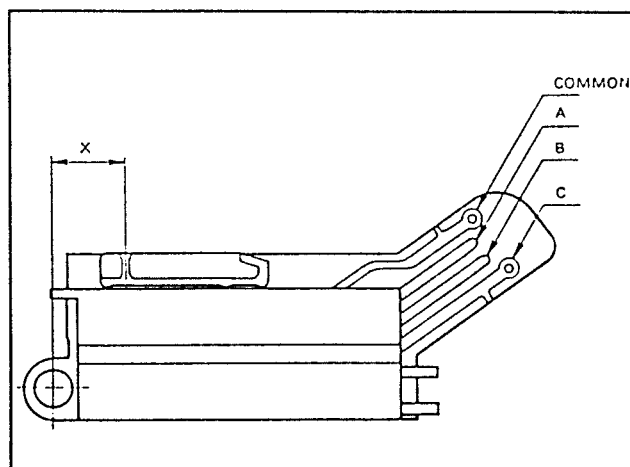


Fig.I-2

Modes	X (mm)	A	B	C
Eject	1.7-2.7	opened	opened	shorted
Blank	2.7-5.7	opened	opened	opened
Load/Unload	5.7-6.7	opened	shorted	shorted
Blank	6.7-8.1	opened	shorted	opened
Stop	8.1-9.1	shorted	shorted	opened
Blank	9.1-12.0	shorted	opened	opened
Play	12.0-13.3	shorted	opened	shorted

Table I-1

Note: "Opened" and "Shorted" in the table is versus the COMMON.

## 2.Operation in Each Section

### 2-1 Gear Train

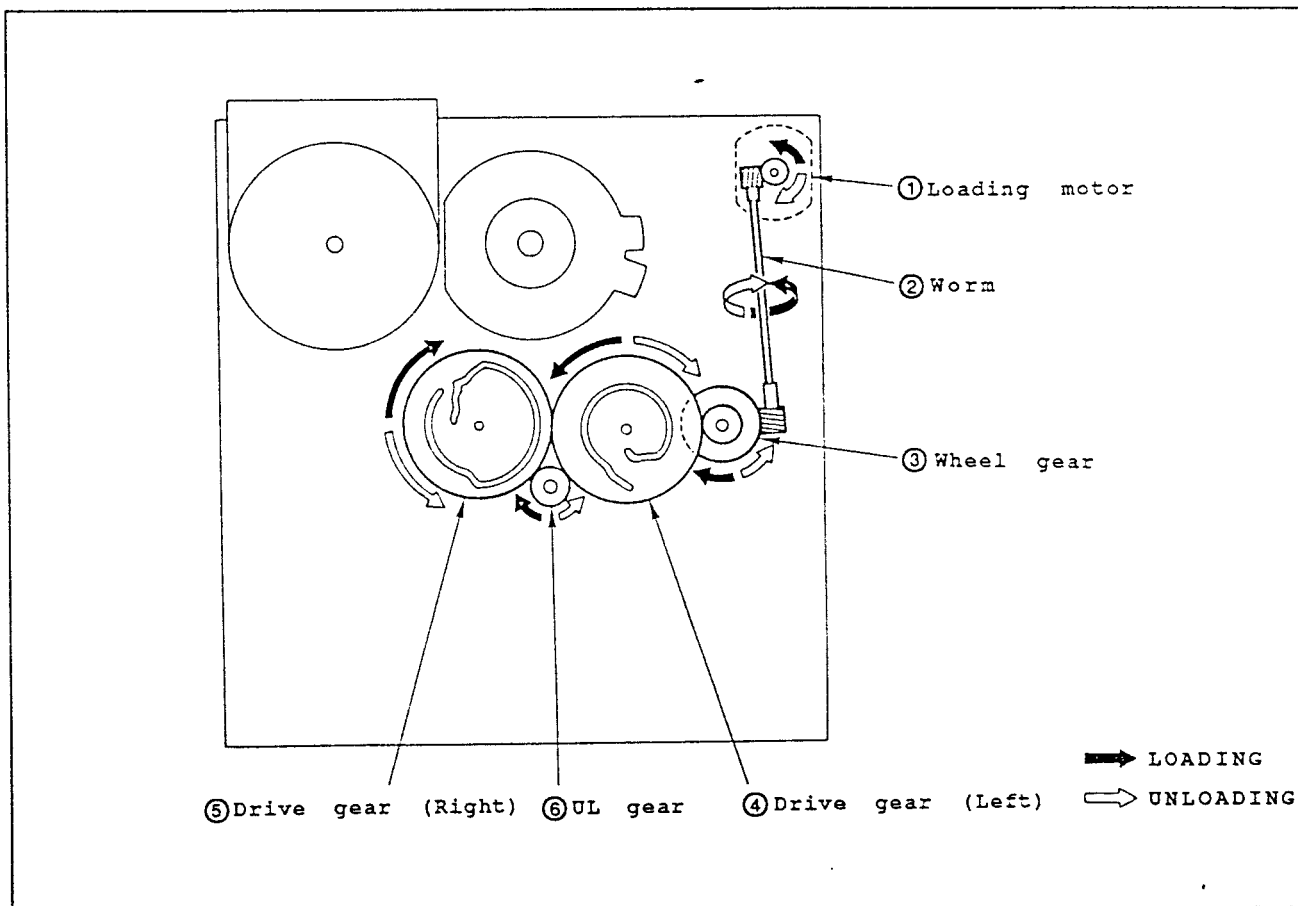
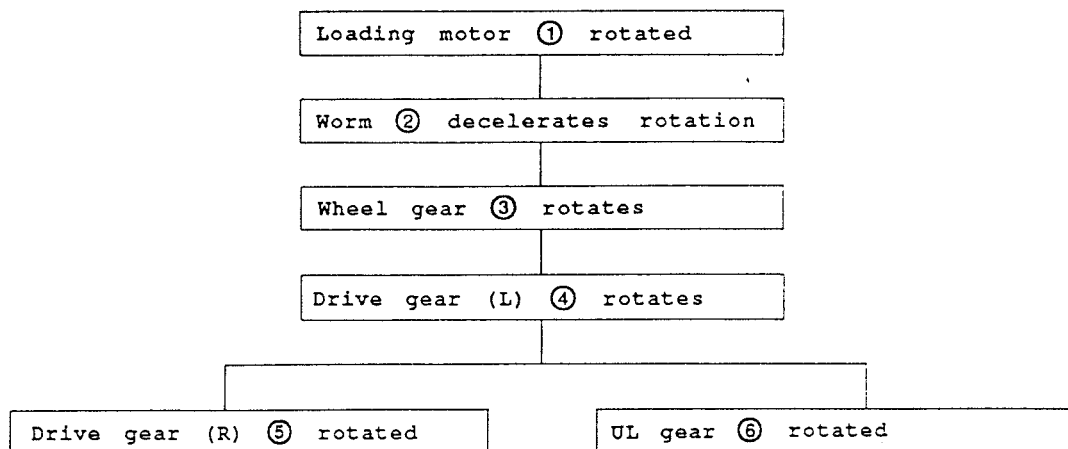


Fig.I-3



## 2-2 Mode SW, Eject Lever, UL Brake

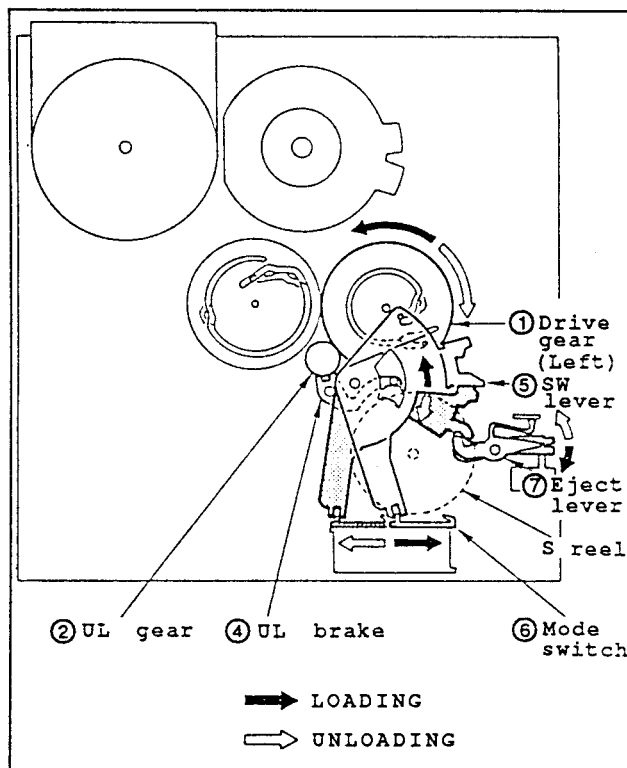
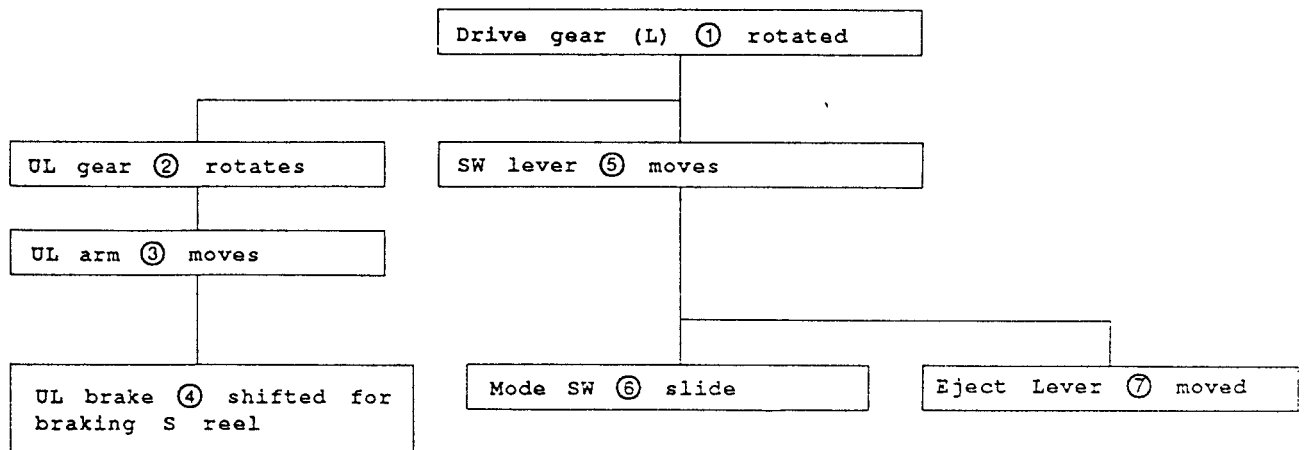


Fig.I-4

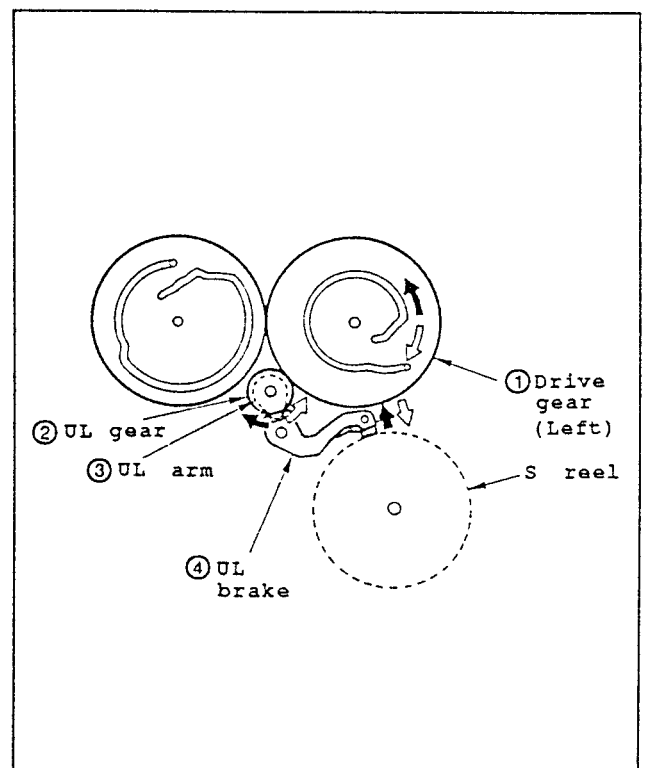


Fig.I-5

## 2-3 TS Brake, LB Brake

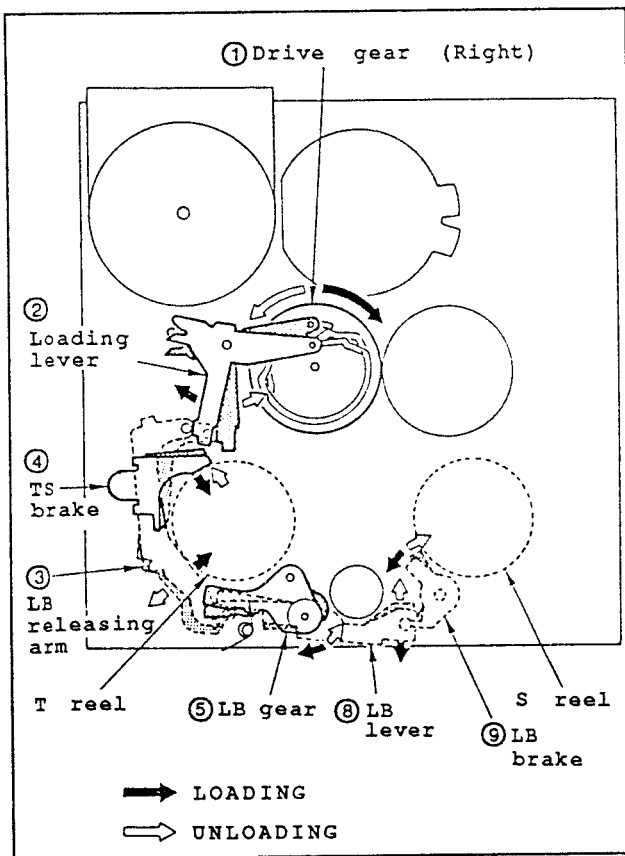
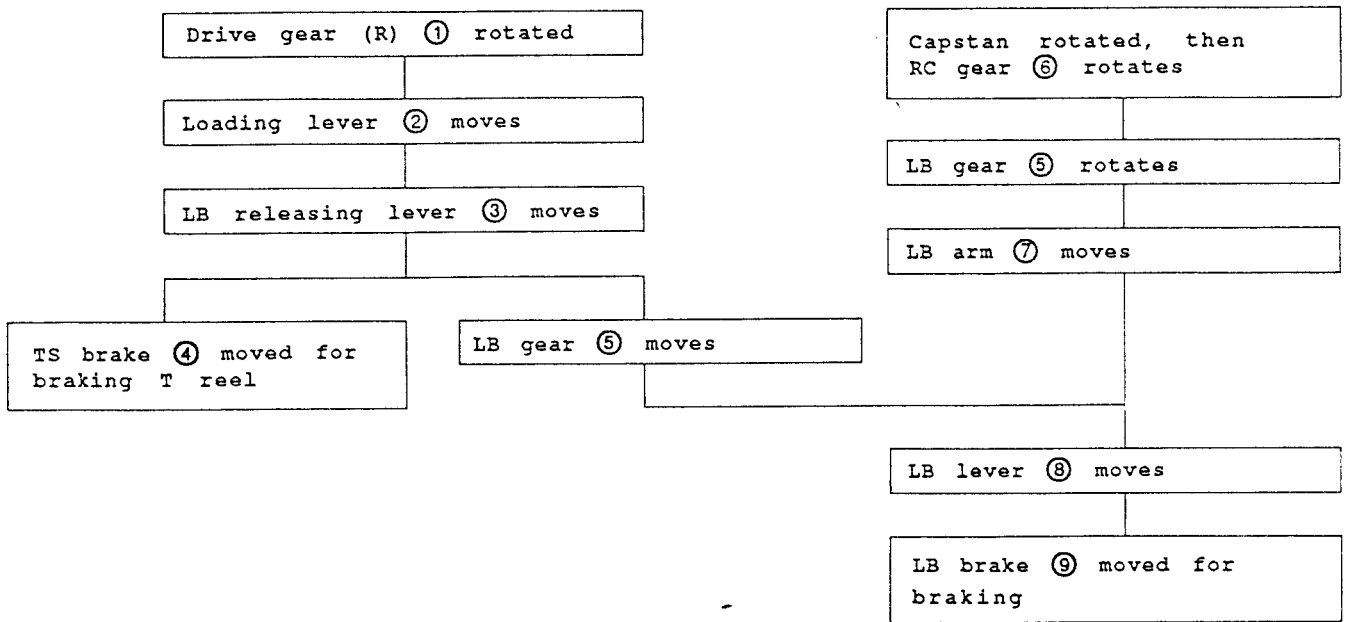


Fig. I-6

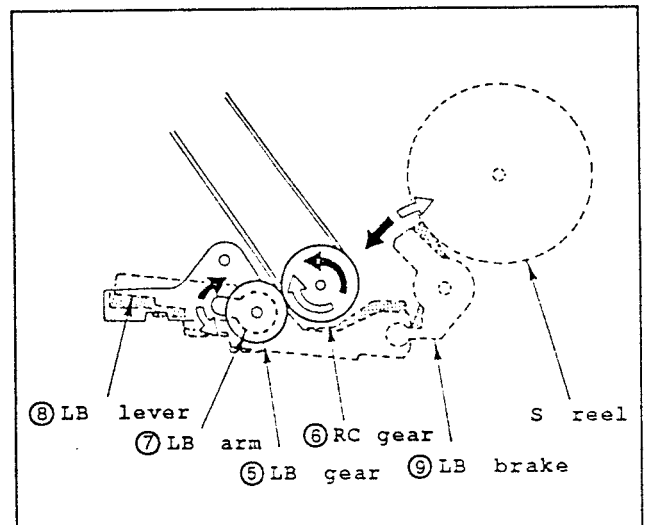


Fig. I-7

2-4 T Brake, S Brake

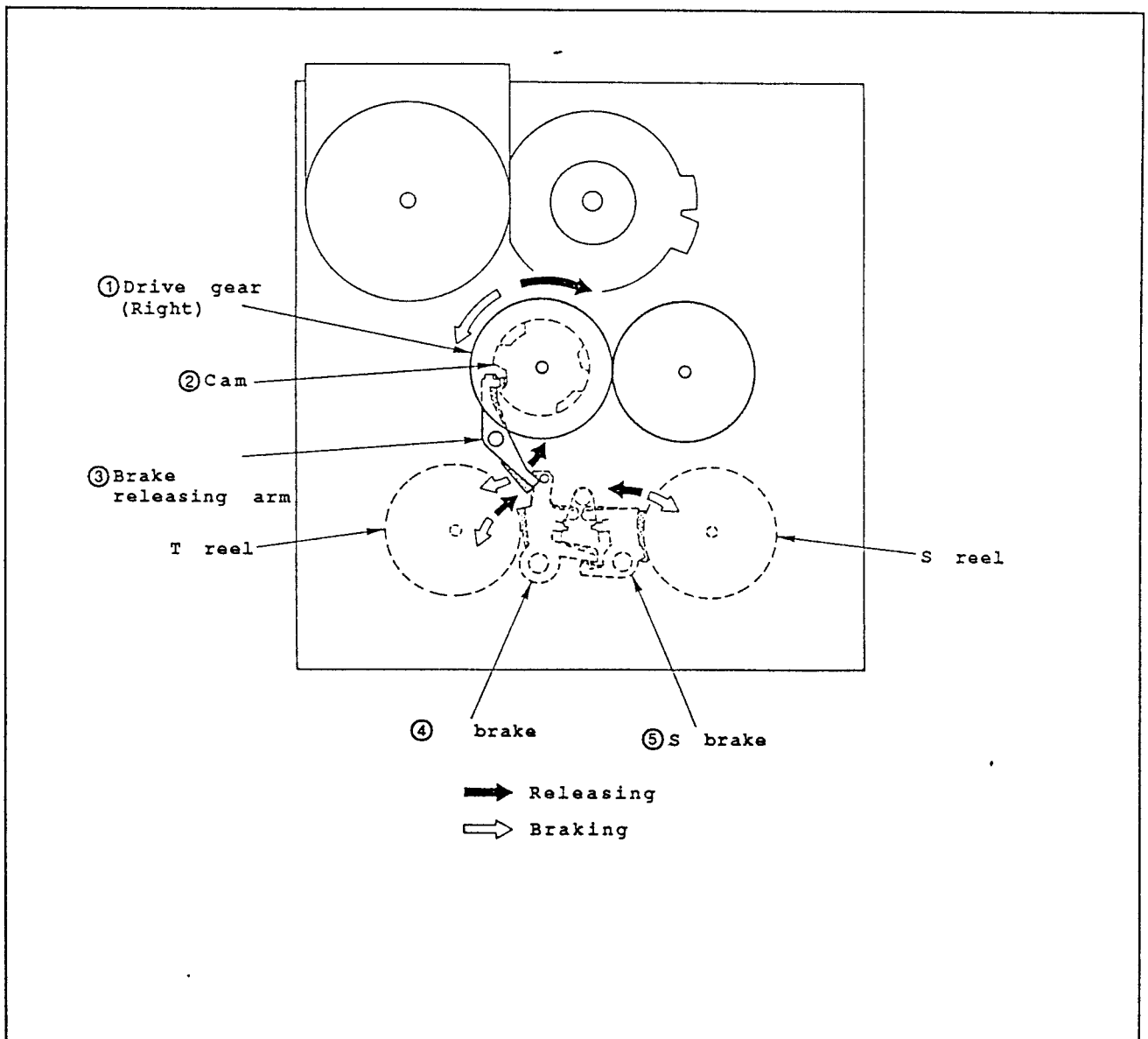
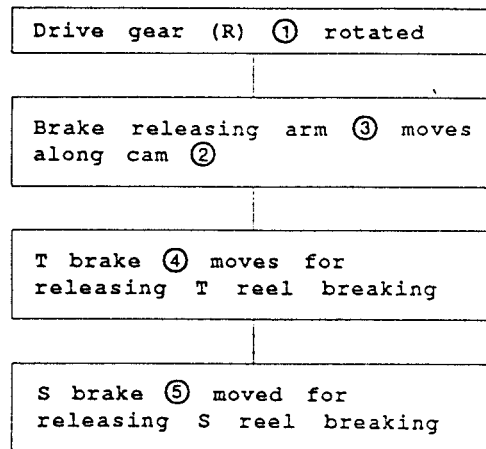


Fig. I-8



2-5 Tension Regulator Arm, Pinch Arm (Pinch Roller)

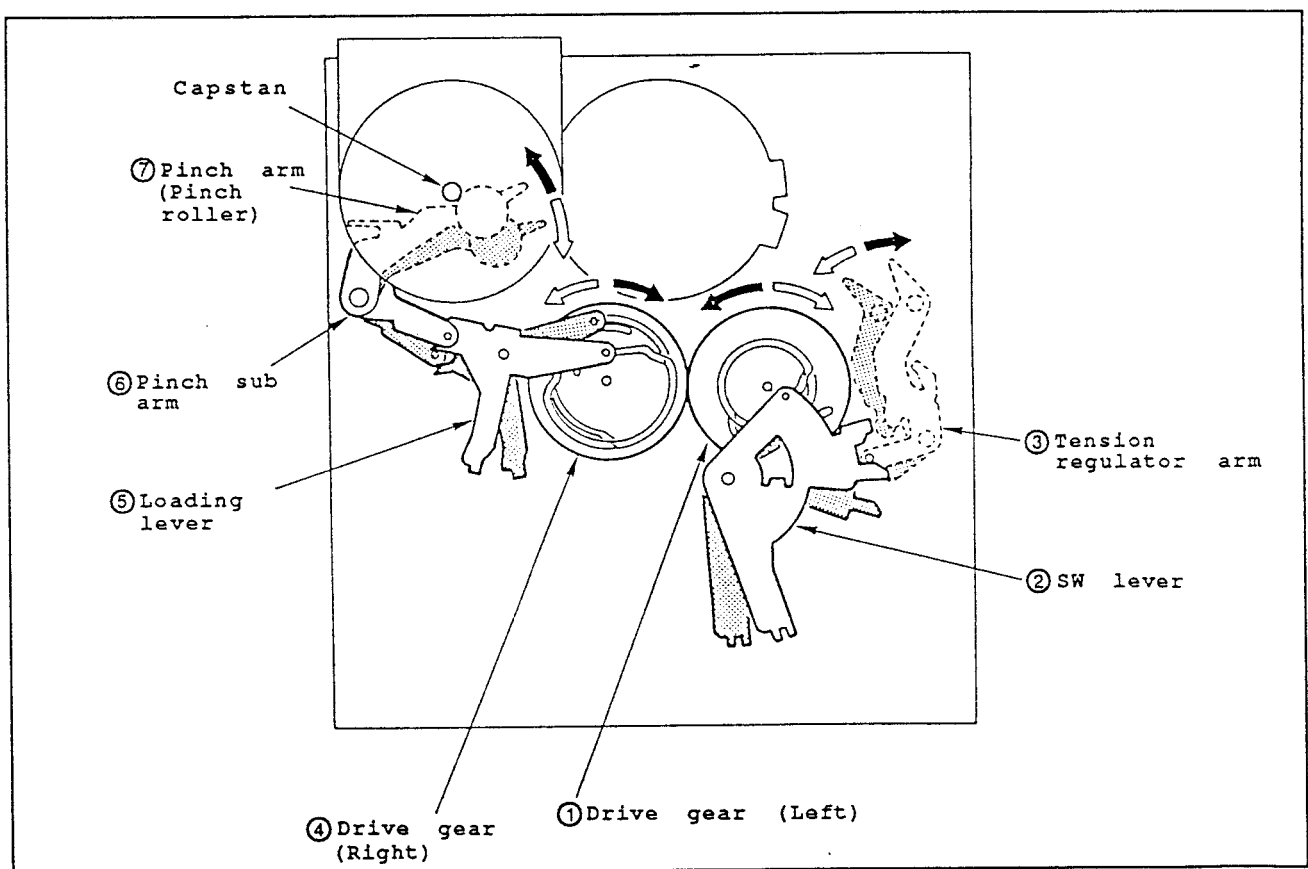
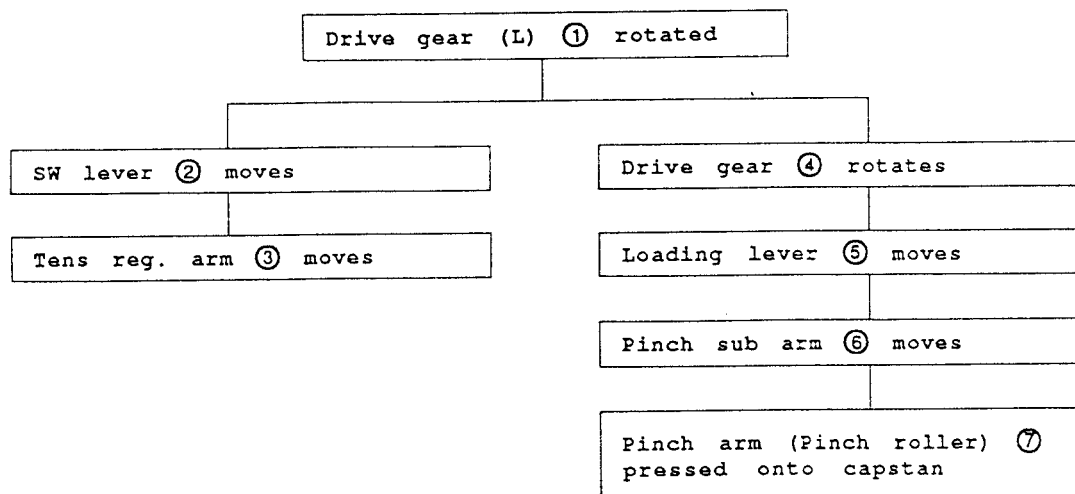


Fig. I-9

# 2-6 Coasters (Right/Left)

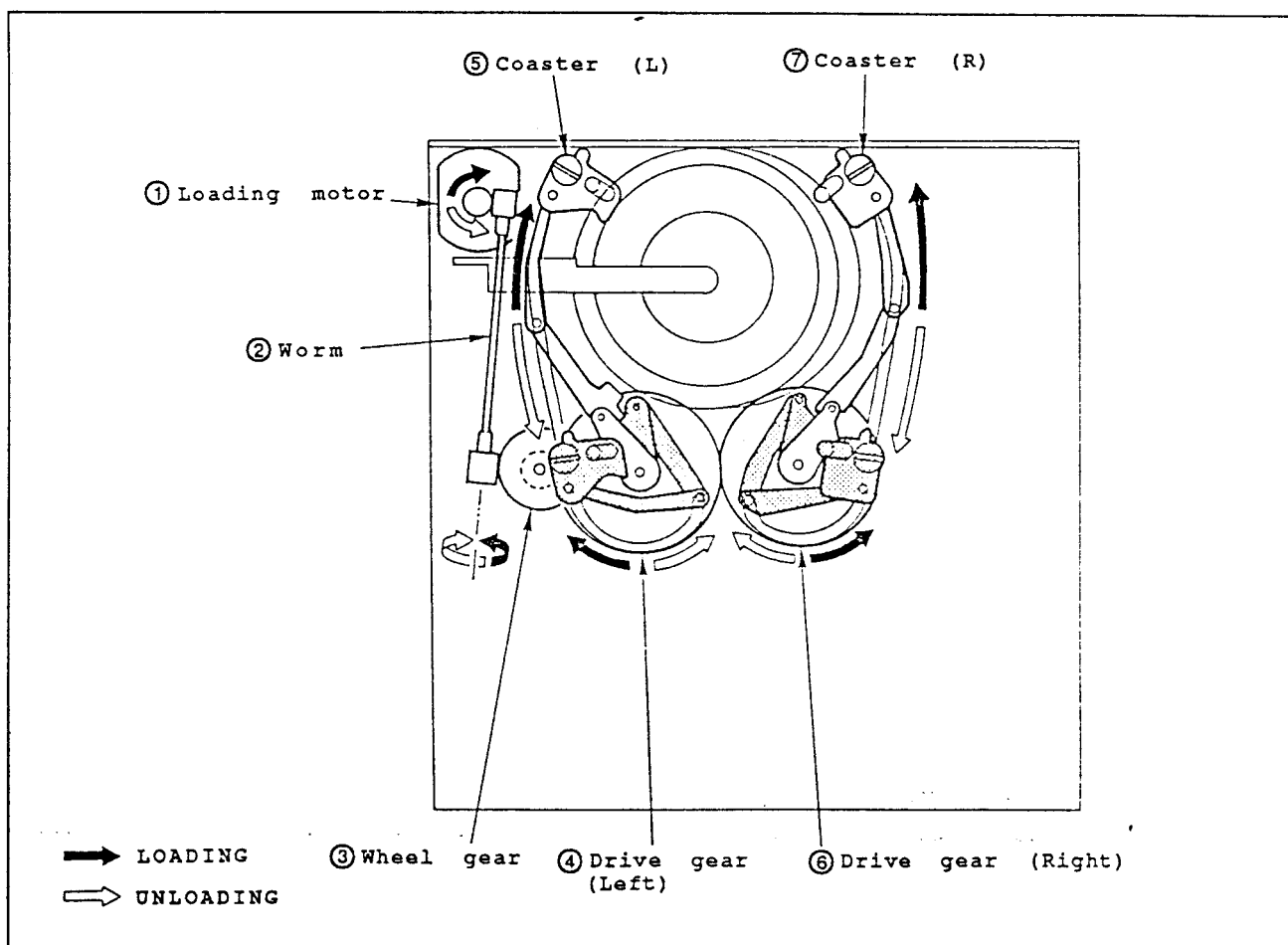
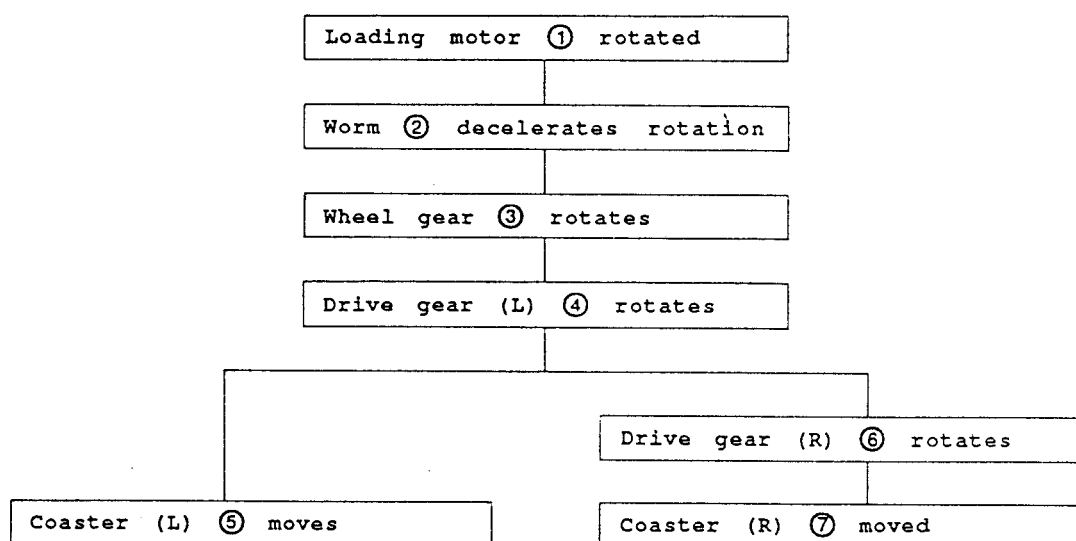


Fig. I-10

2-7 Reel Tables (Take-up/Supply)

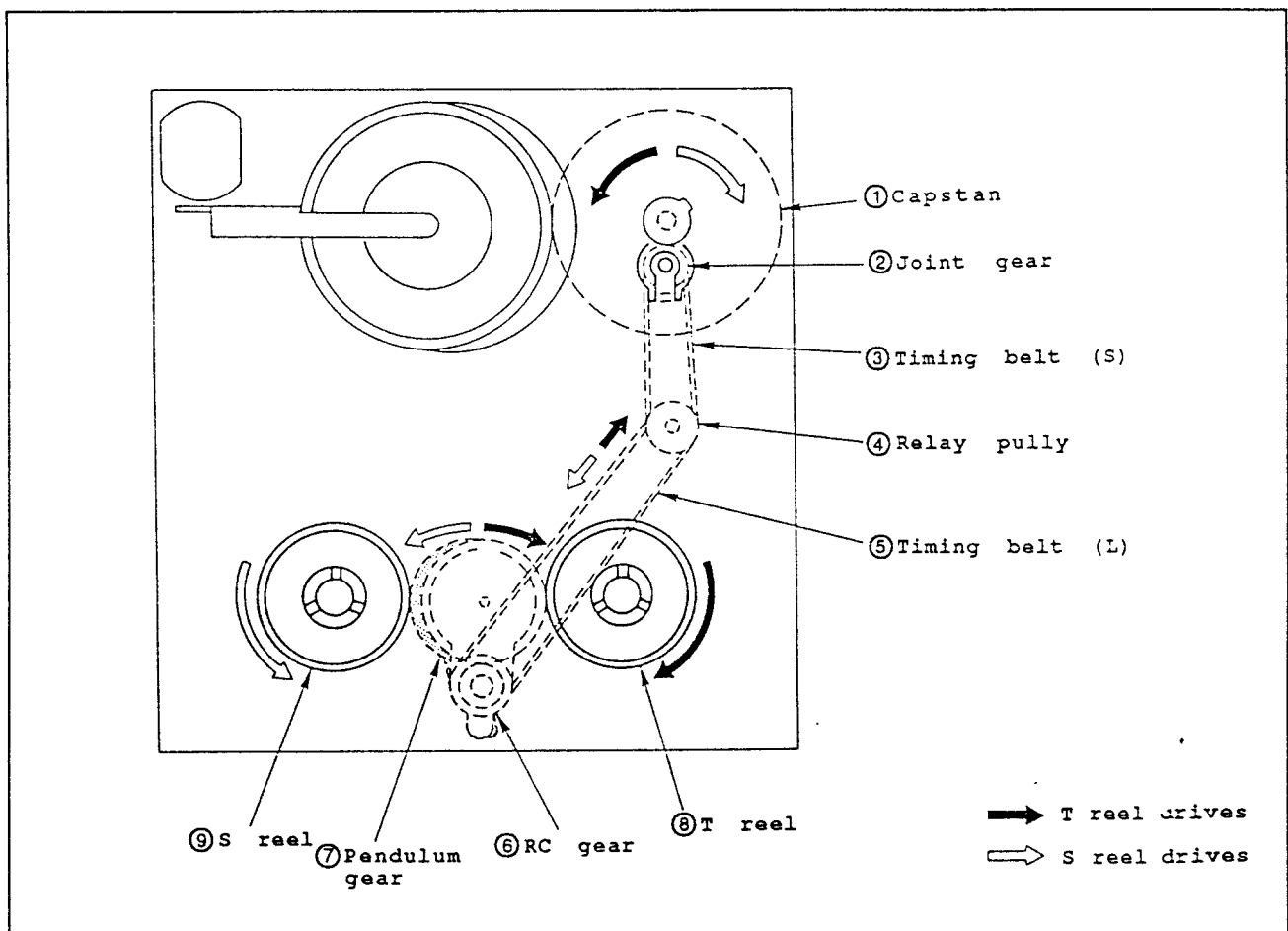
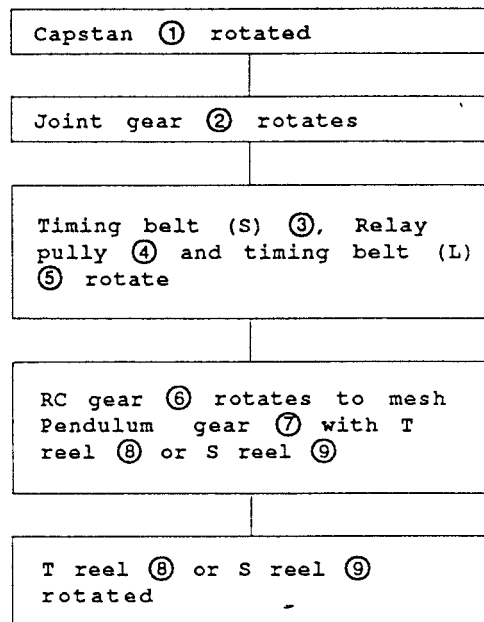


Fig.I-11



3. Each Mode Transition  
3-1 Cassette In

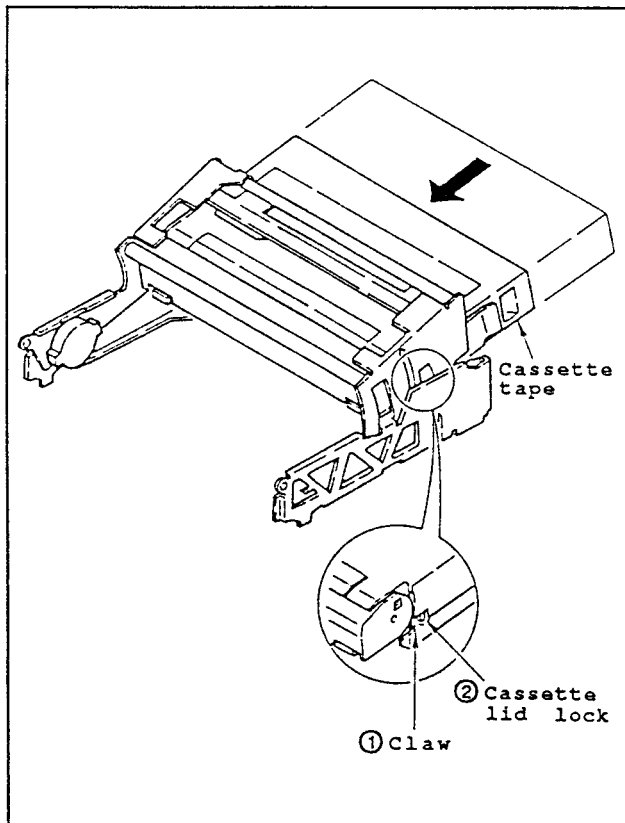
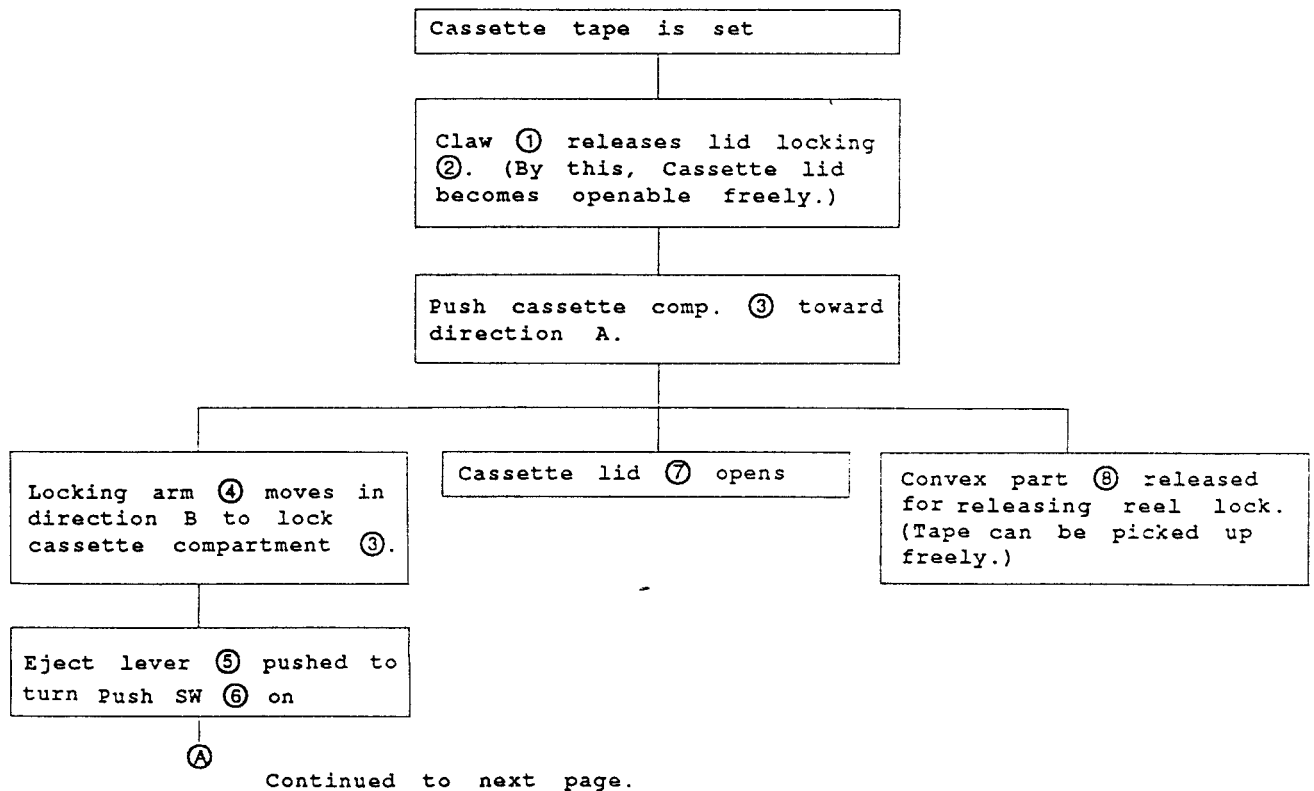


Fig. I-12

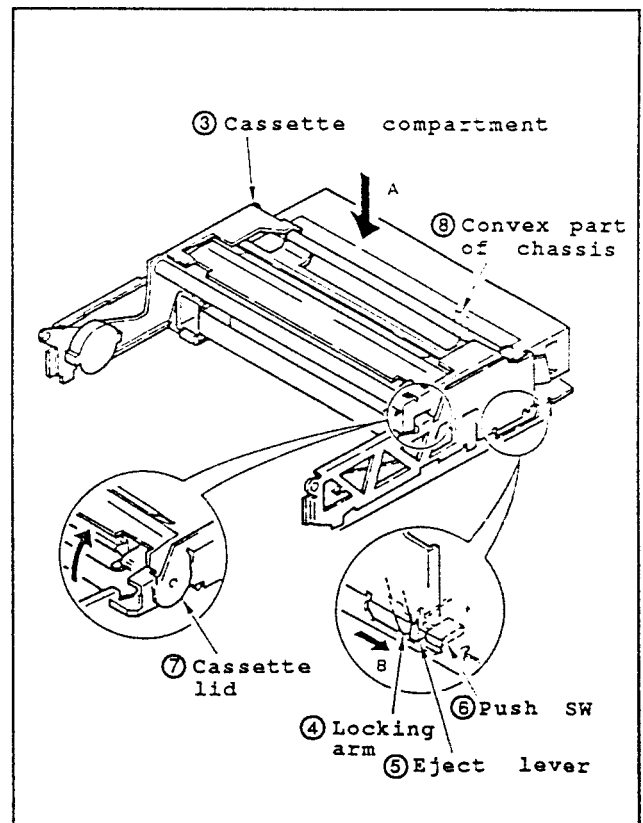


Fig. I-13

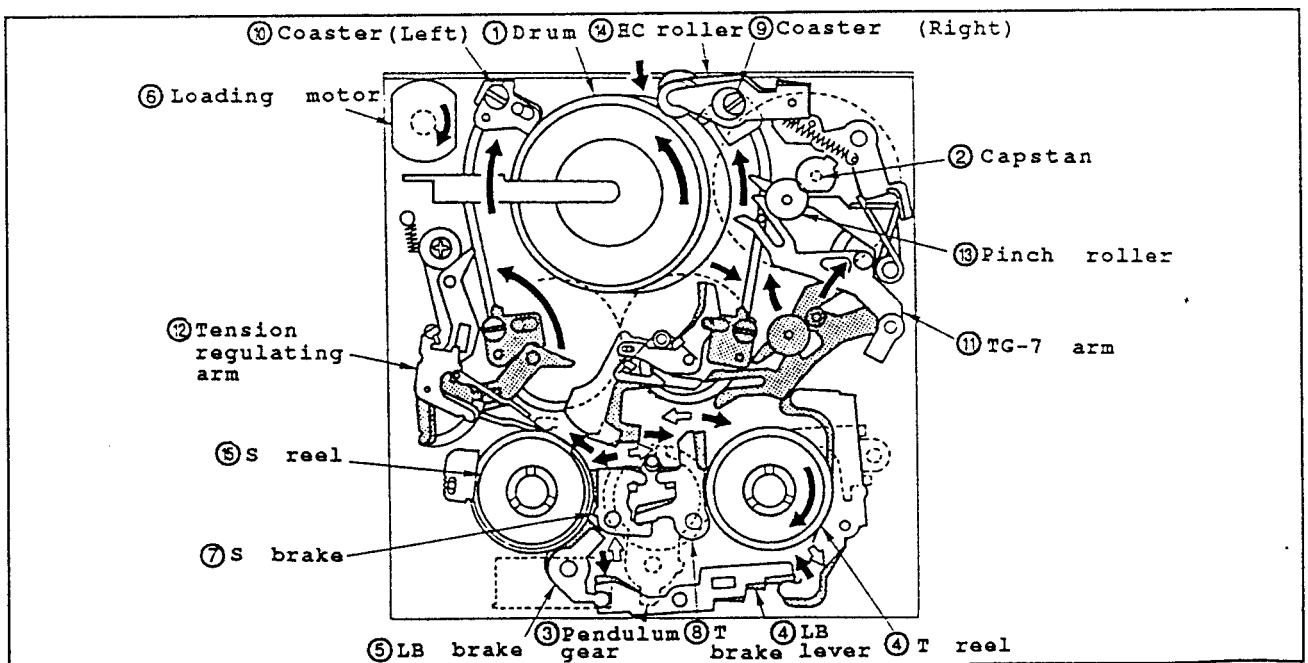
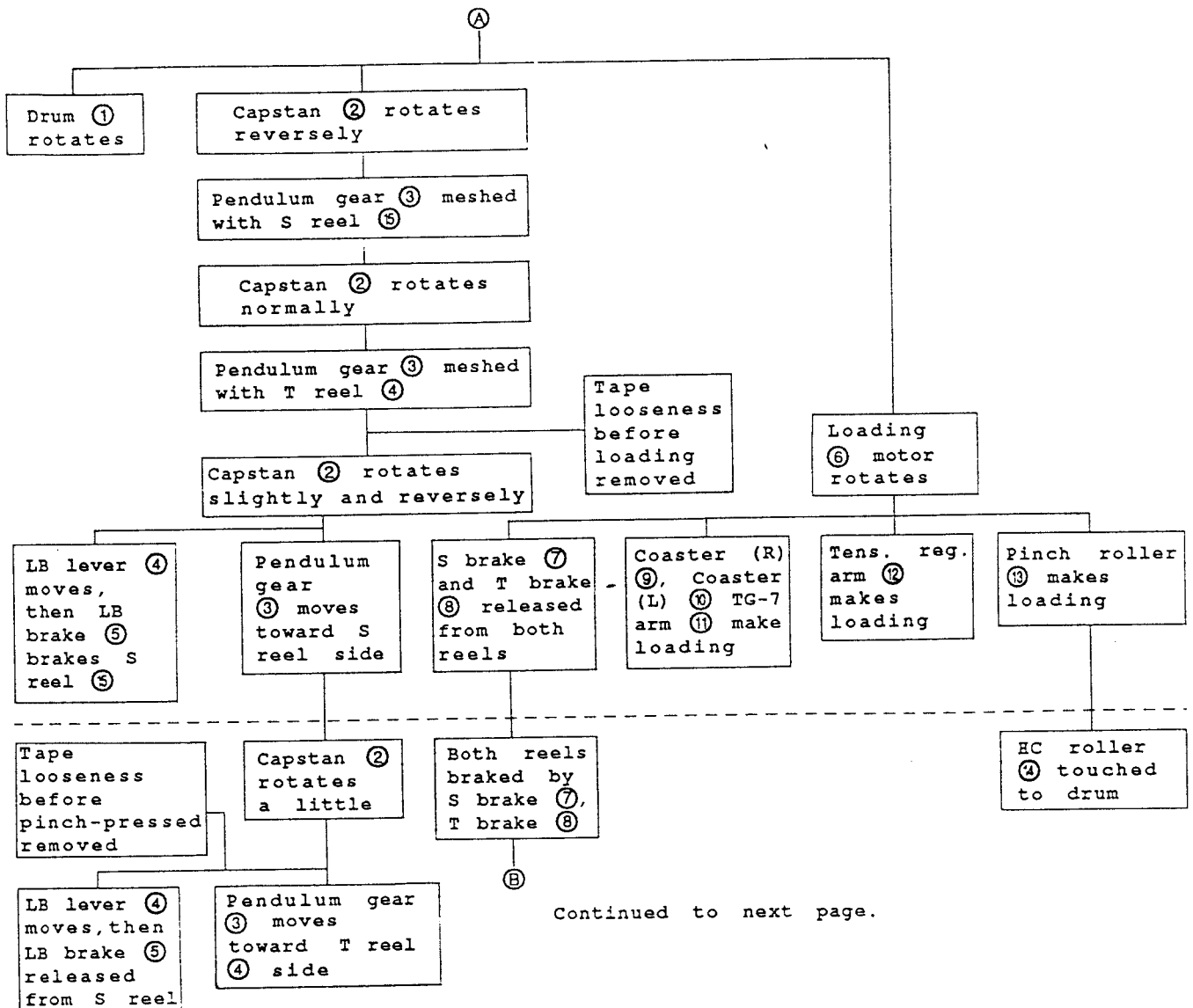


Fig. I-14

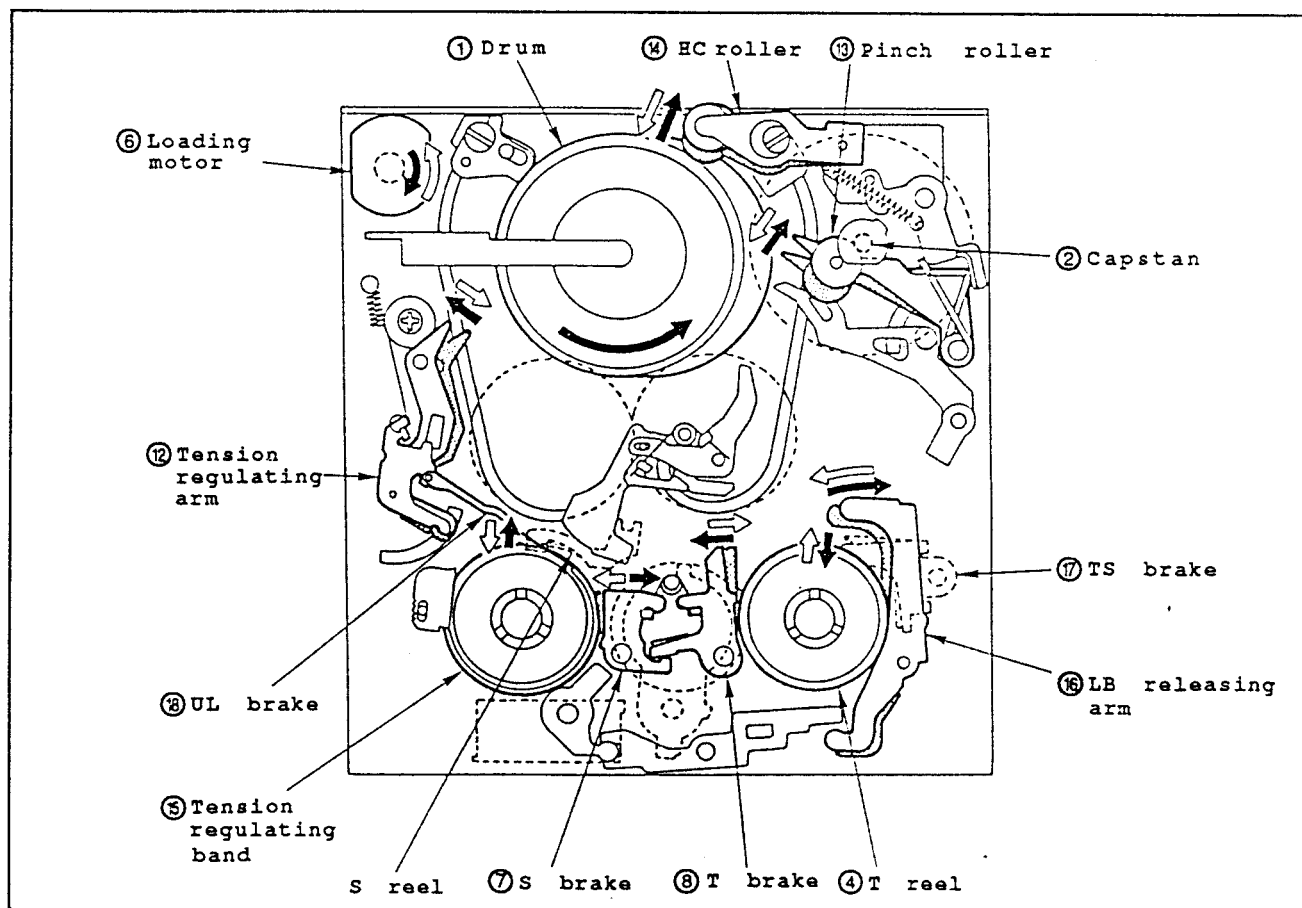
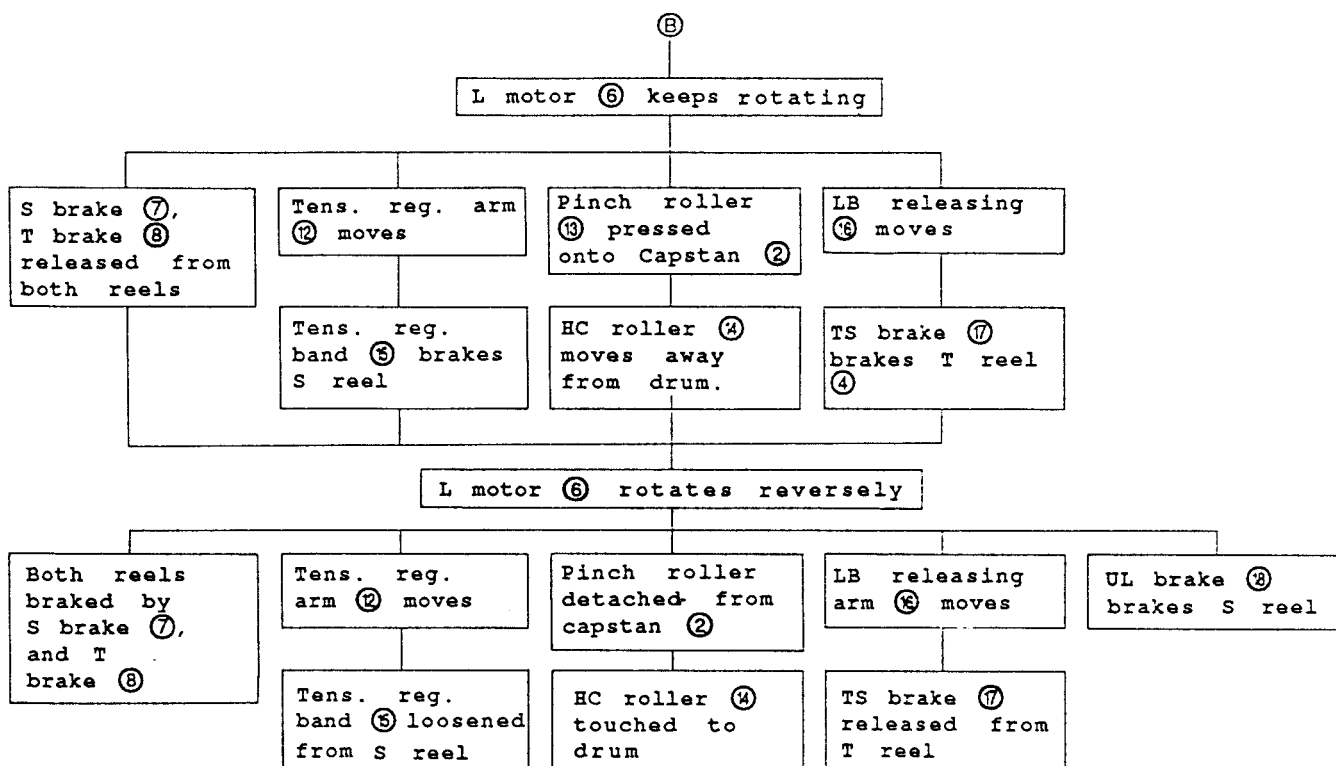


Fig.I-15



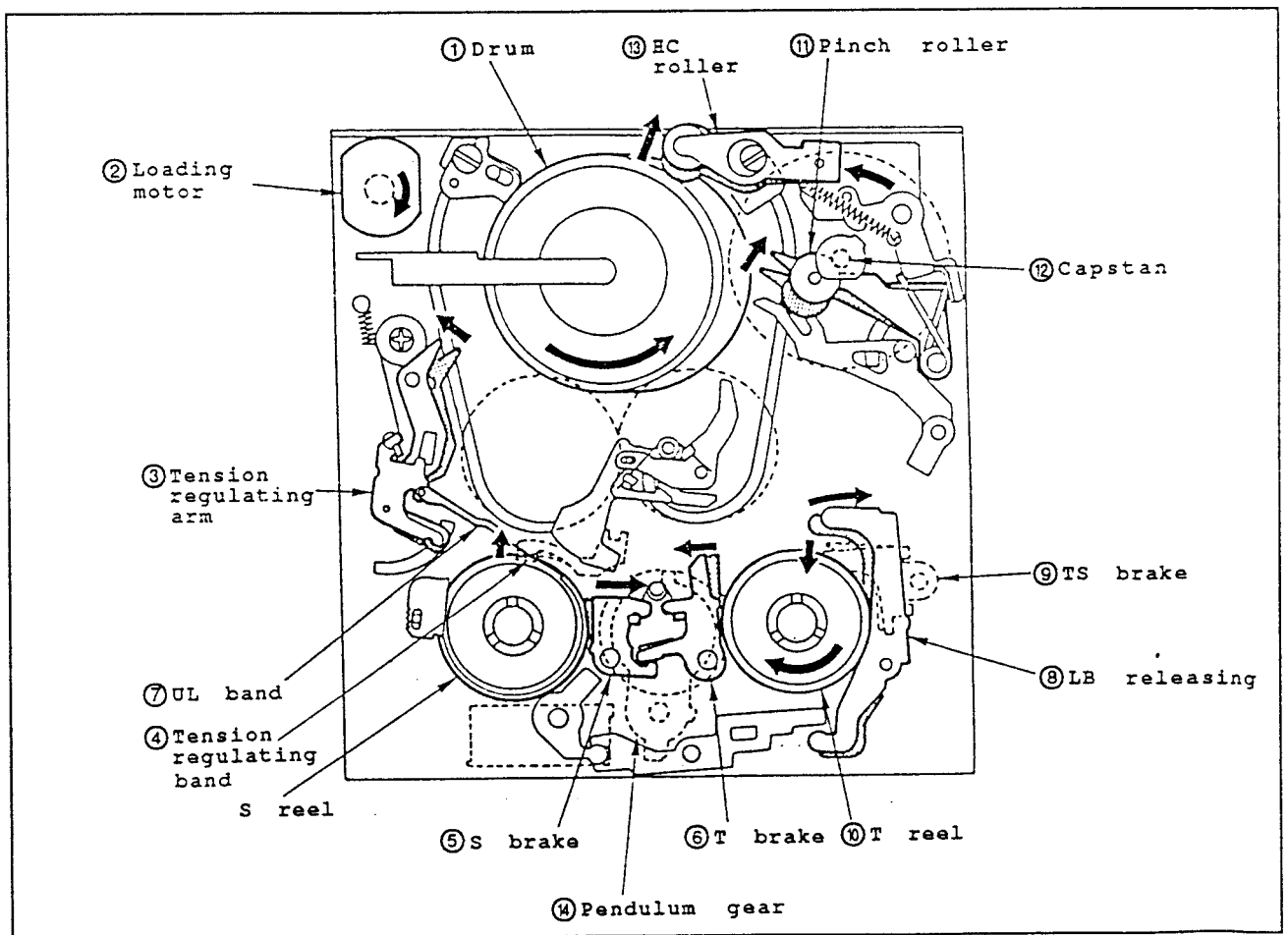
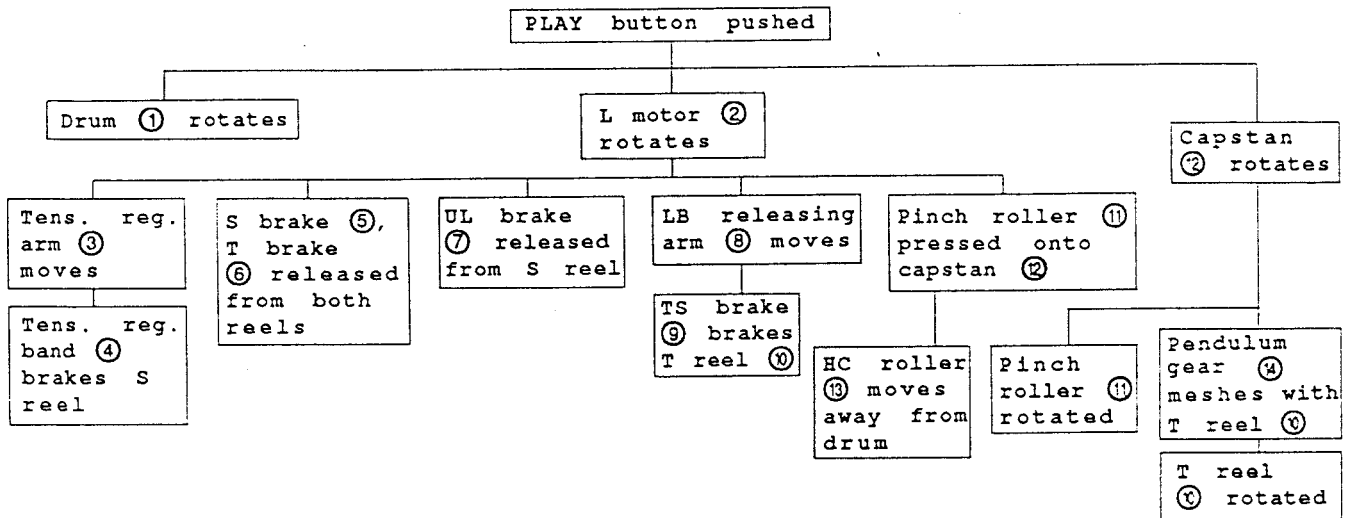


Fig.I-16

### 3-3 Tape Path

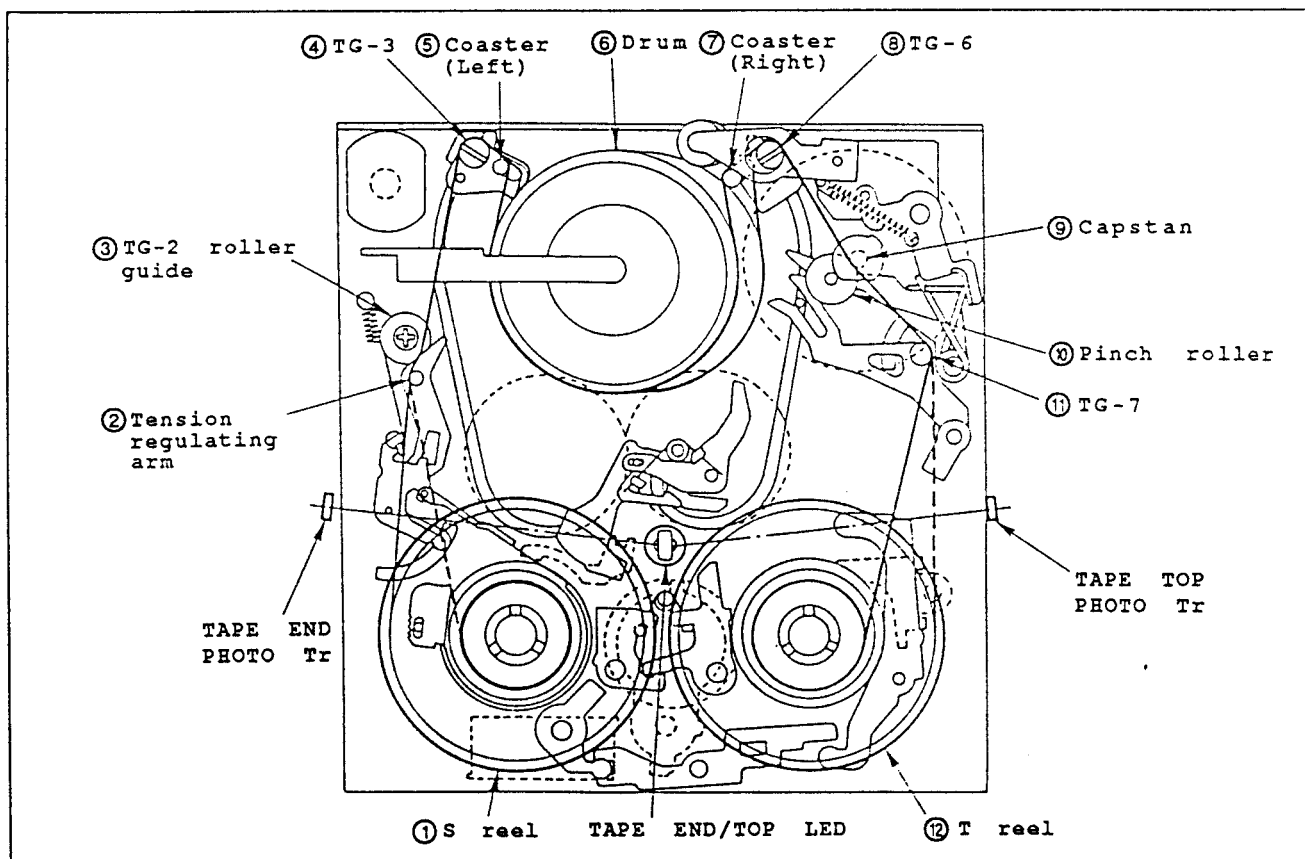
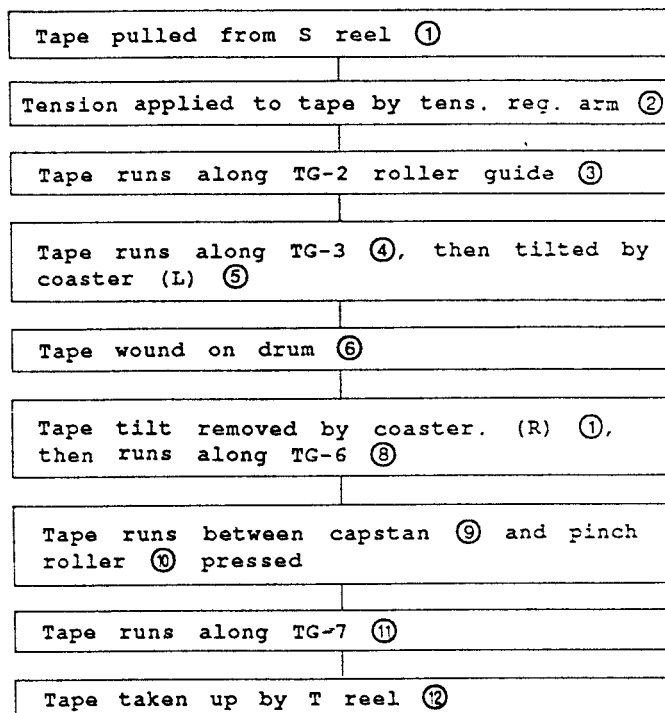


Fig. I-17

3-4 Pause

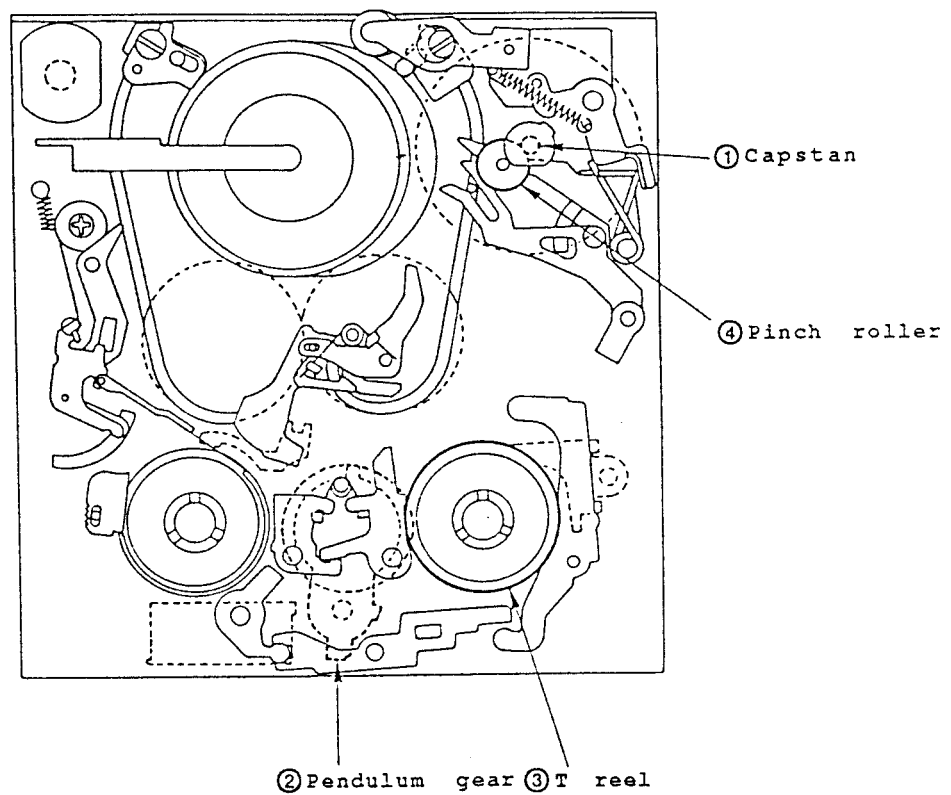
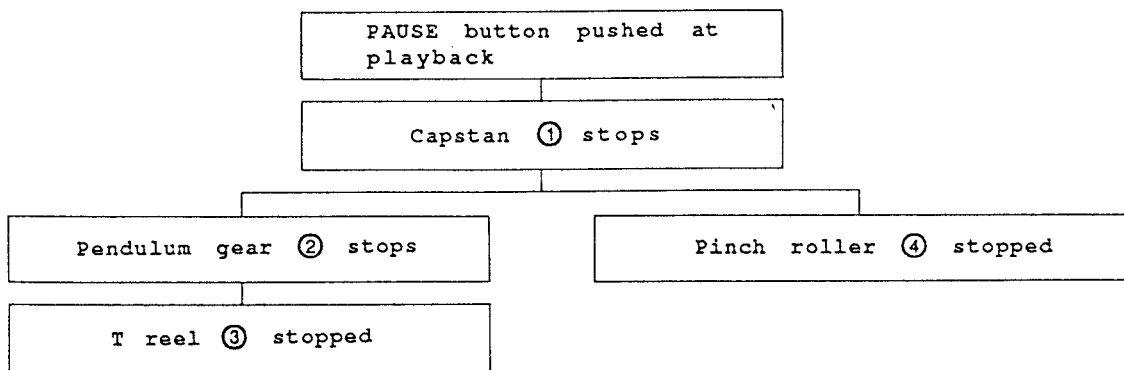


Fig.I-18



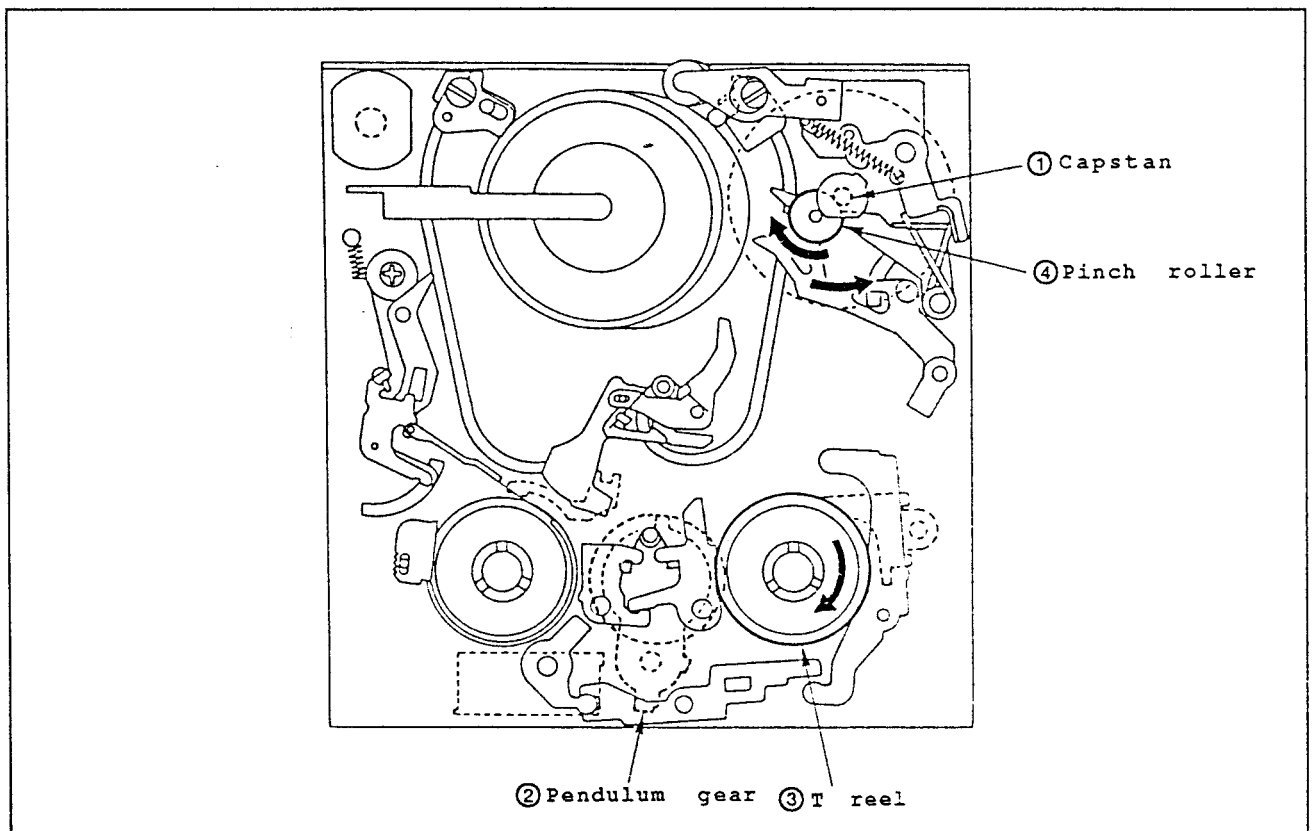
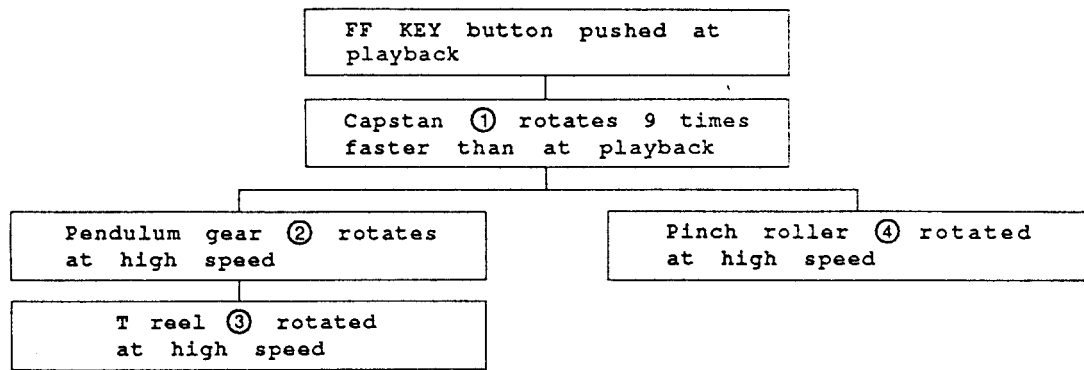


Fig.I-19

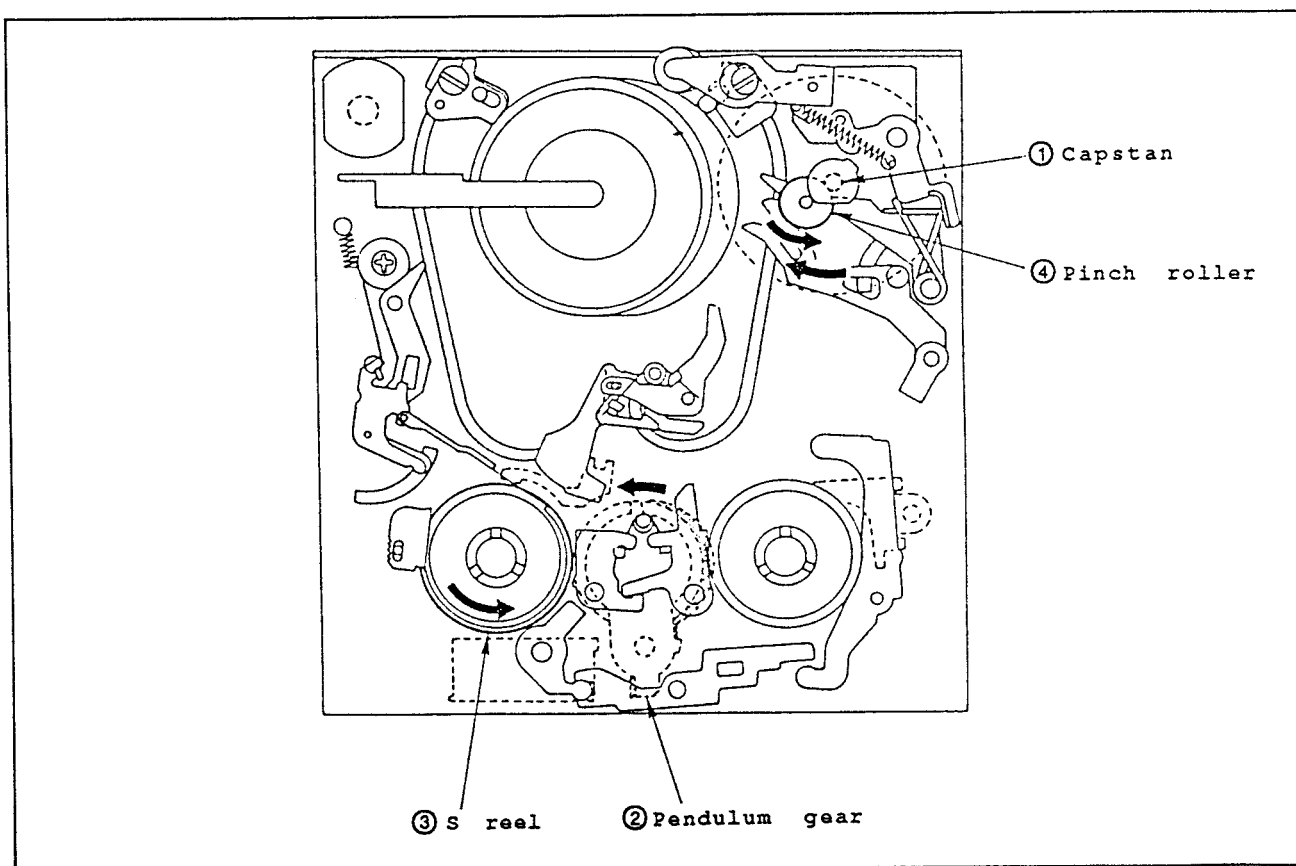
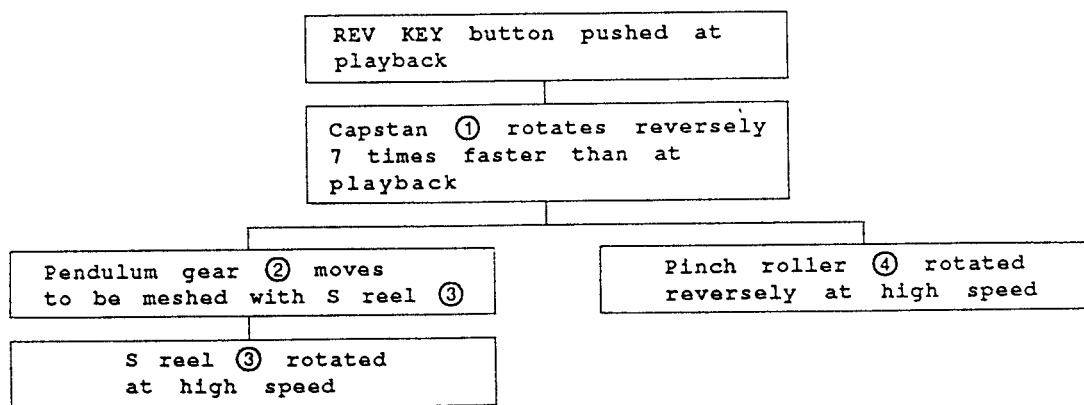


Fig.I-20

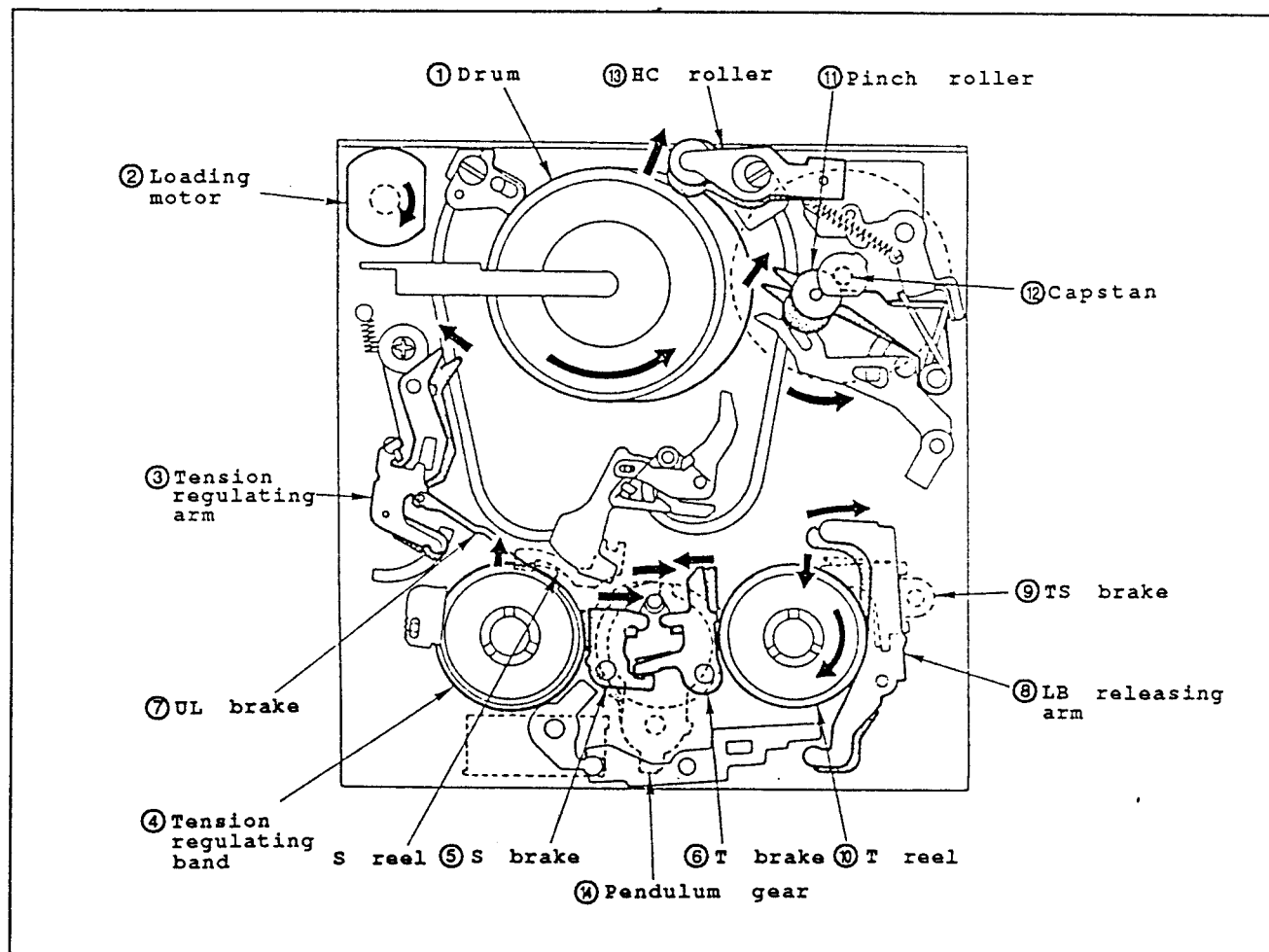
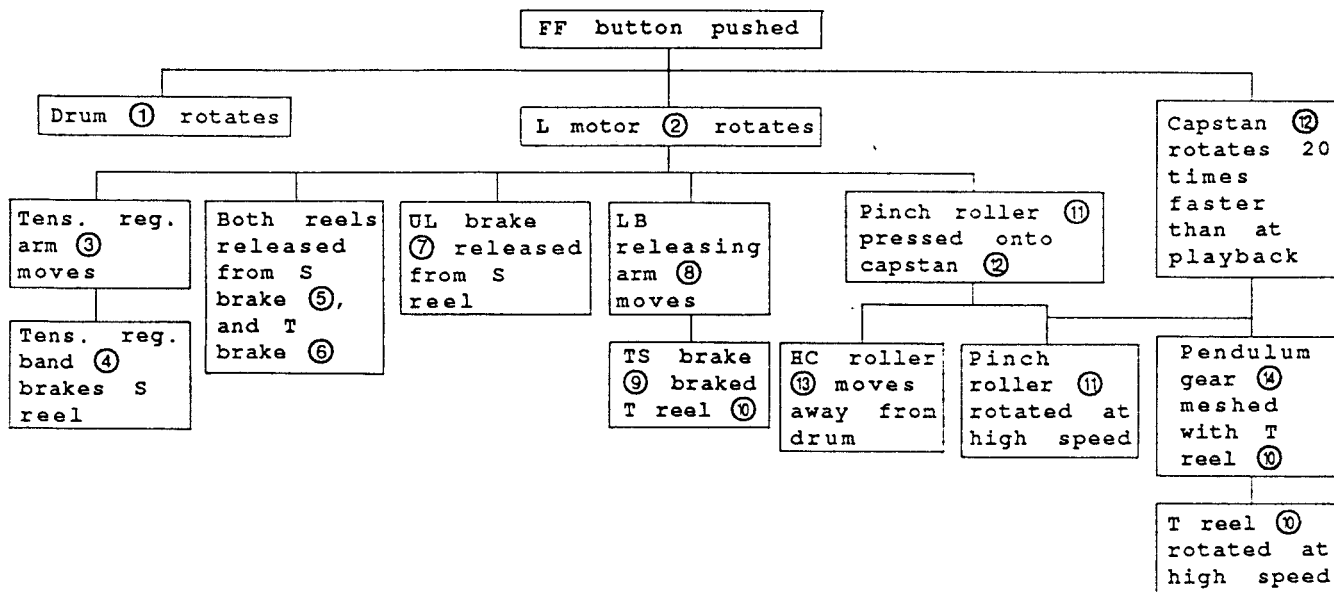


Fig. I-21



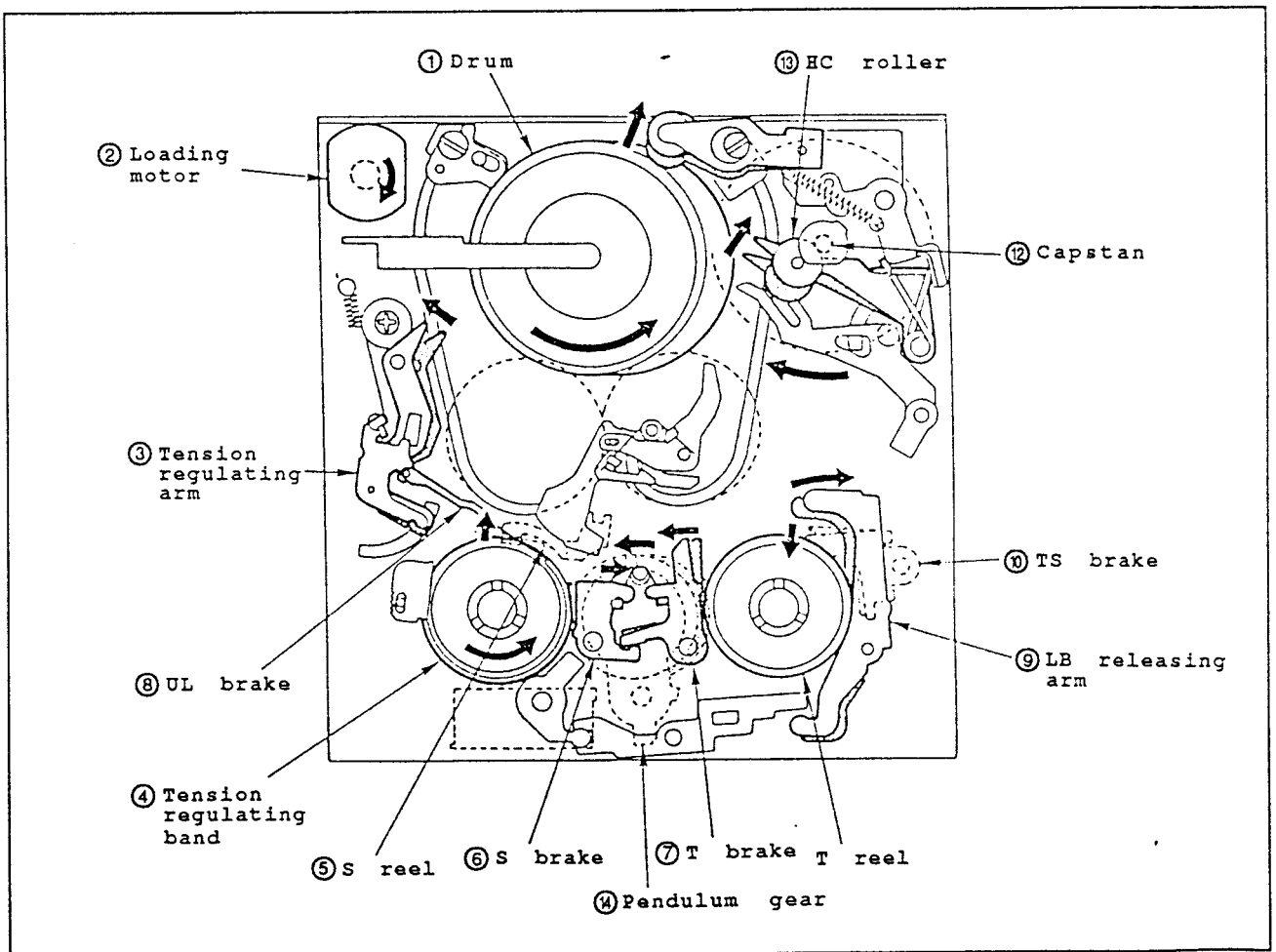
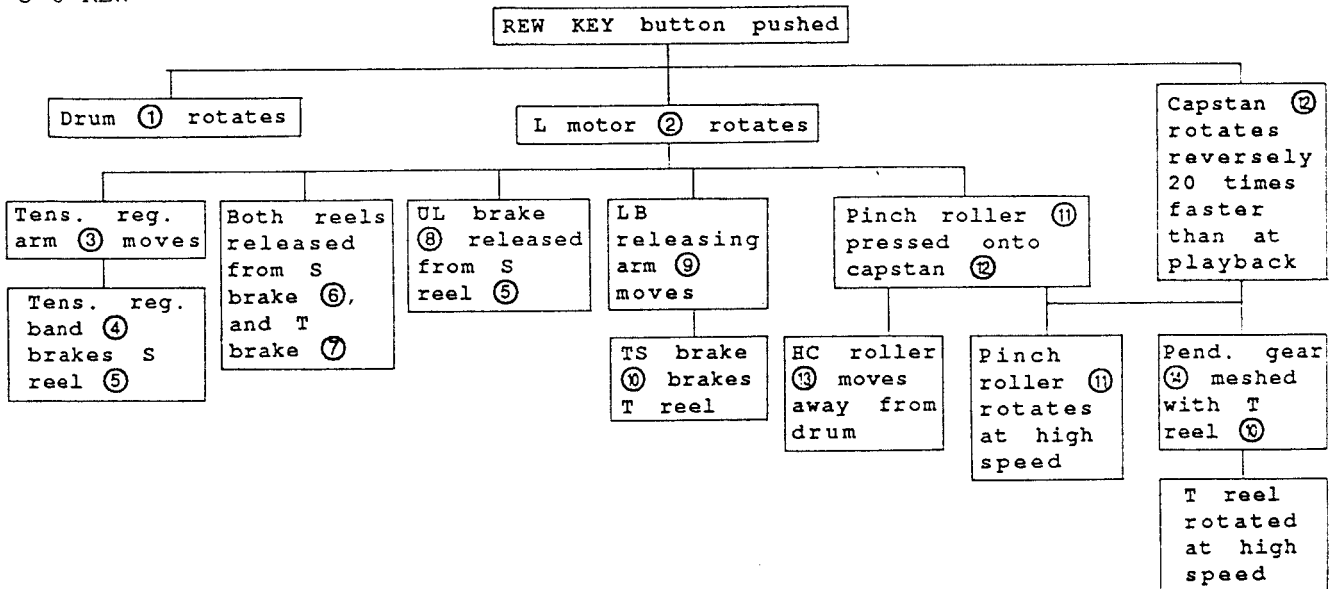


Fig.I-22

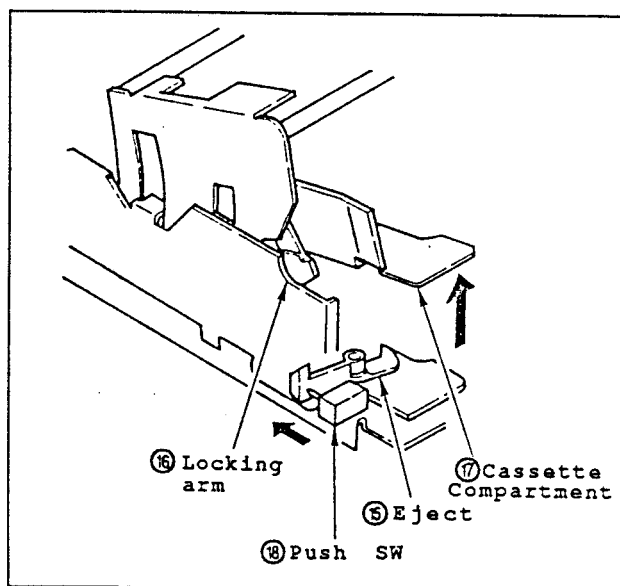
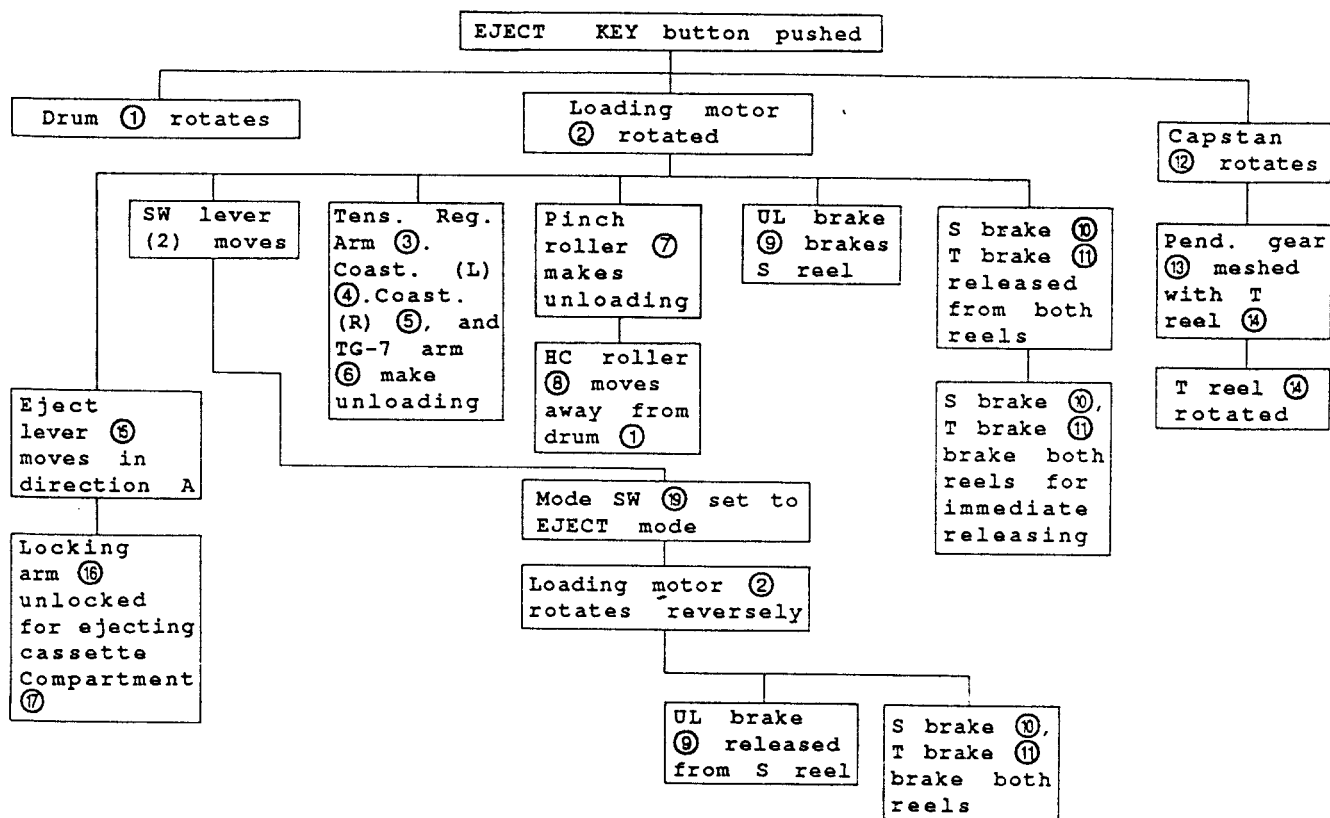


Fig. I-23

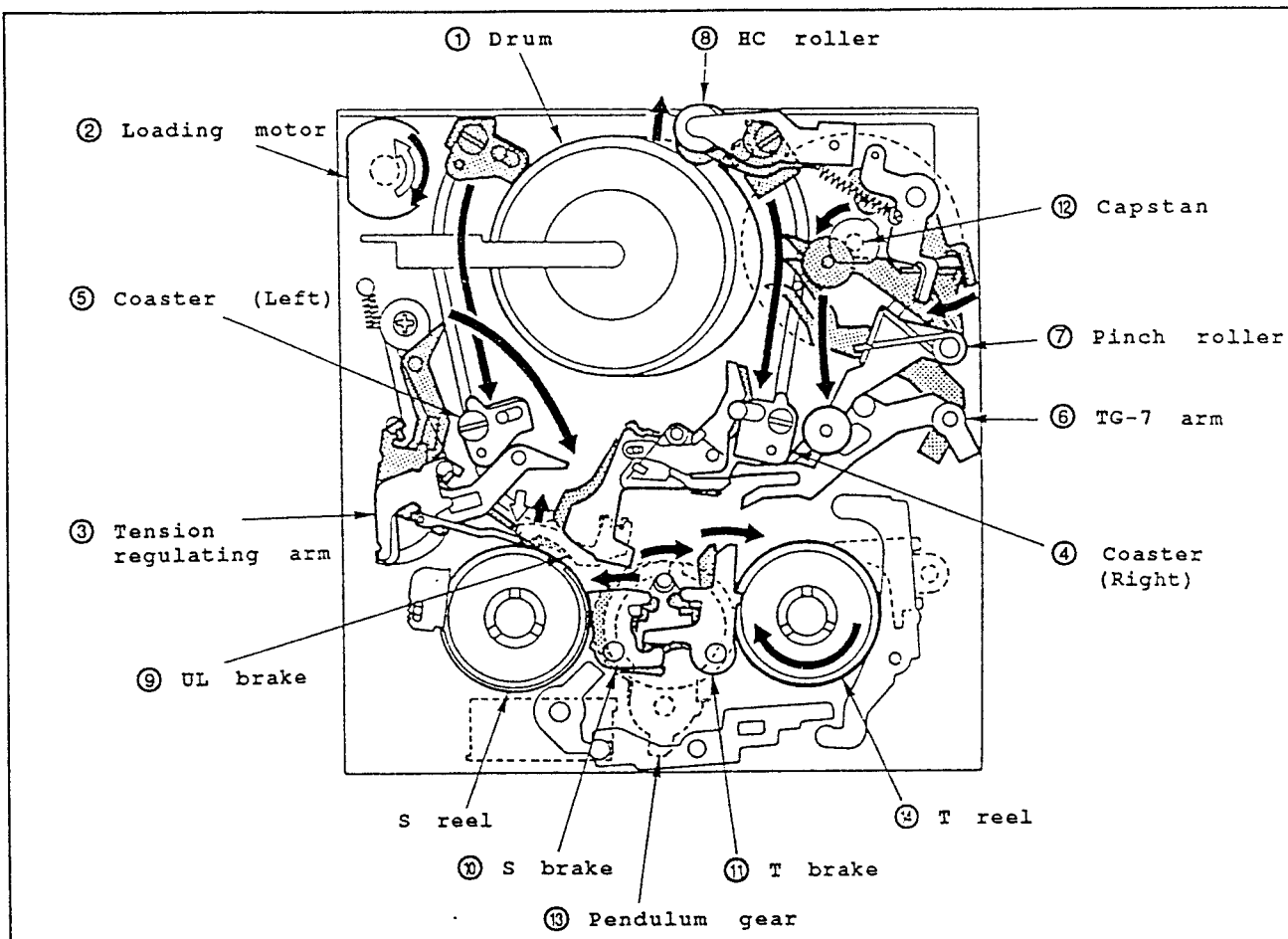


Fig.I-24



## Chapter 2 Adjustments/Replacement

### 1. Recorder Section Mechanical Check/Adjustment

\*Note: For details, i.e. removal of covers, C.B.A.S, location of test points, etc., refer to the service manual of product which equips this mechanism.

#### 1-1 List of Maintenance Tools and Supplies

##### Maintenance Tools

Description	Tool No.	Remarks
Cassette Torque Gauge for 8mm	DY9-1047-000	
Alignment Tape K (Tracking B)	DY9-1085-000	New (for NTSC)
Alignment Tape L (Tracking C)	DY9-1086-000	New (for PAL/SECAM)
Hexagonal wrench (0.89mm)		New (Commercially available)
Rotary drum jig kit		Enclosed in repair kit

##### Supplies

Description	Tool No.	Remarks
Lens Tissue K-1, K-3	CY9-4023-003	Camera Service Dept.
Molyton Grease	DY9-3009-000	
Hydroflud NT-68	DY9-3010-000	*See the note below
Ethyl alcohol		Commercially available

\*Note: In U.S.A., contact video service Div., Canon U.S.A., Inc. for ordering.

#### 1-2 Removal of cassette Compartment Assembly (Fig.II-1)

- (1) Remove setscrews ① and ②.
- (2) To detach cassette compartment assembly, slide the assembly a little toward you. (A parts in Fig.II-1 detached)  
Then take out the assembly.

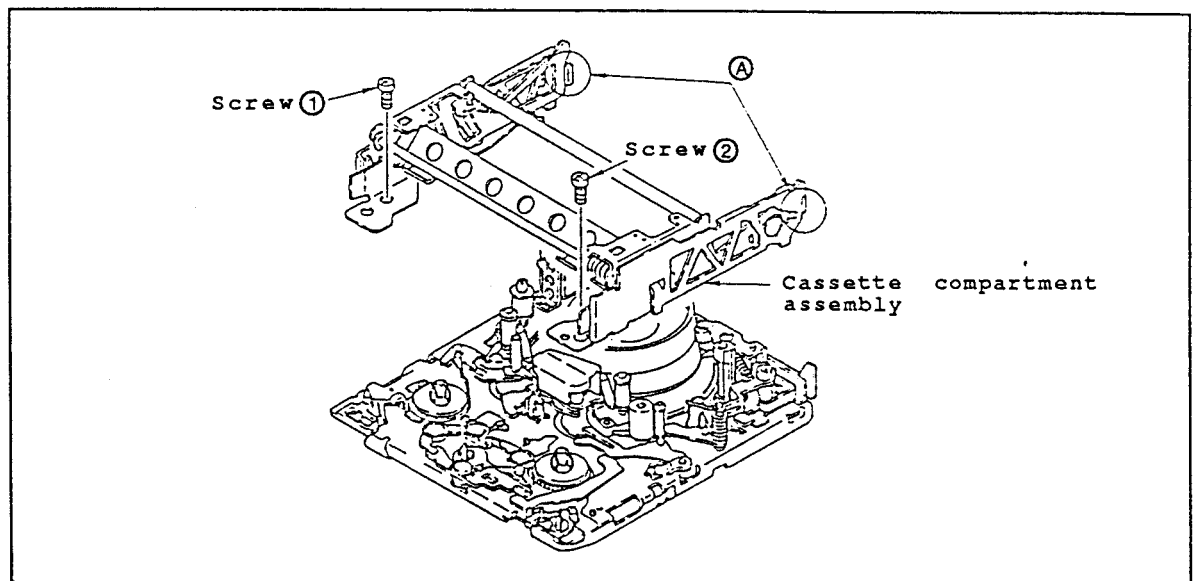


Fig.II-1

### 1-3 Tape Loading/Play without LS cassette Compartment Assembly and Tape

\*Note: Remove a strong light source when performing the followings.  
If performed near the strong light source, a tape sensor misoperated.

#### 1-3-1 Loading (Fig.II-2)

- (1) Cover a tape sensor LED with an opaque cap ① or equivalent.
- (2) To press a pin, attach a tape onto the Recog. switch ②.
- (3) Move the Eject lever ③ in the direction of ④.

#### 1-3-2 Play (Fig. II-2)

- (1) Set loading state.
  - (2) Snap a rubber band ④ around the S and T reels.
  - (3) To rotate T reel, push the play Key Switch.
- When the tape starts moving, push the tension regulating arm ⑤ in the direction of ⑥. (At this time, the tension regulating band is released, and the S reel moves.)

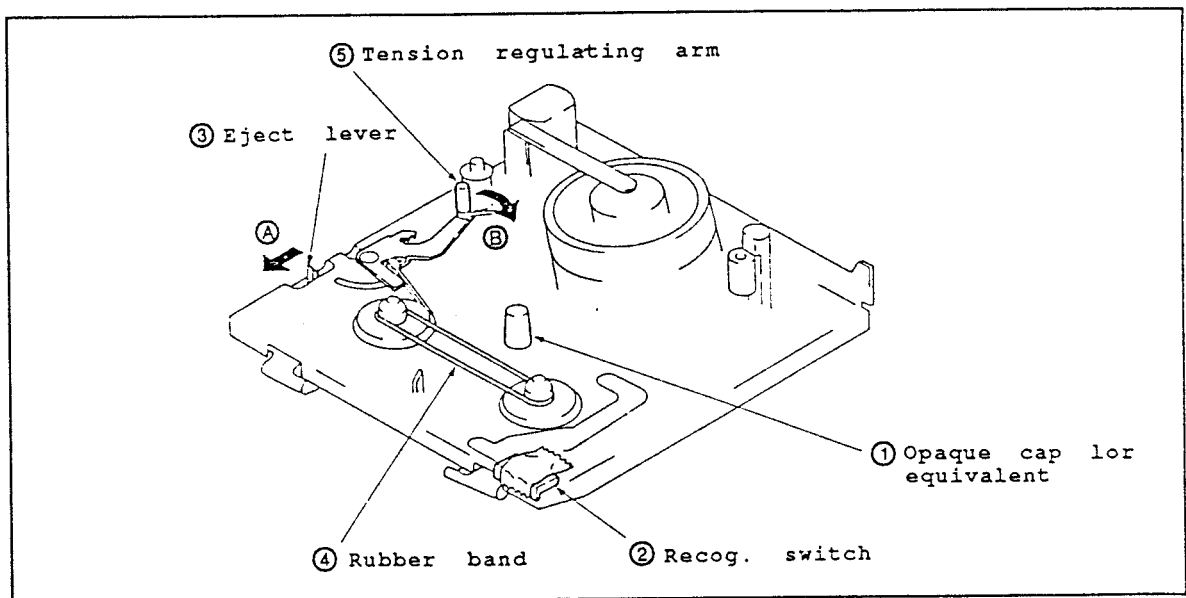


Fig.II-2

#### 1-4 Independent Operation of Mechanism Section

\*Note: Perform this operation when the C.B.A.S are removed.

- (1) To expose the terminals, remove the tape from the upper part of loading motor. (Fig.II-3)
- (2) Supply 3V (approx.) to the terminals of loading motor ① from the constant voltage supplier.
- (3) For confirming the mechanical modes, use the output of slide switch ② (mode switch). (Fig.II-4, Table II-1).

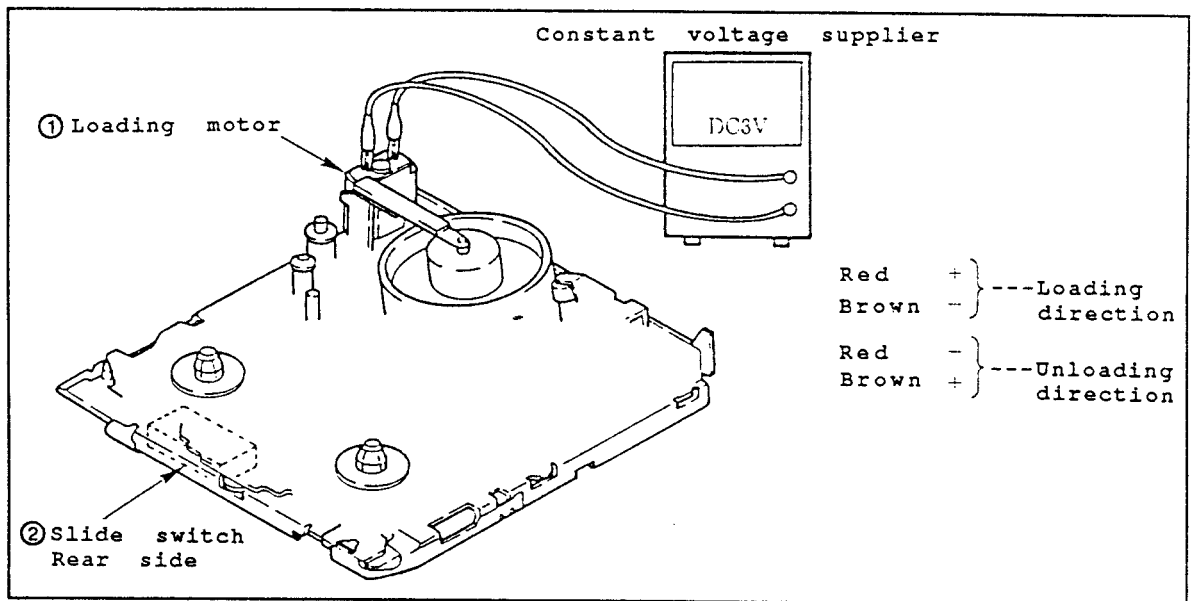


Fig.II-3

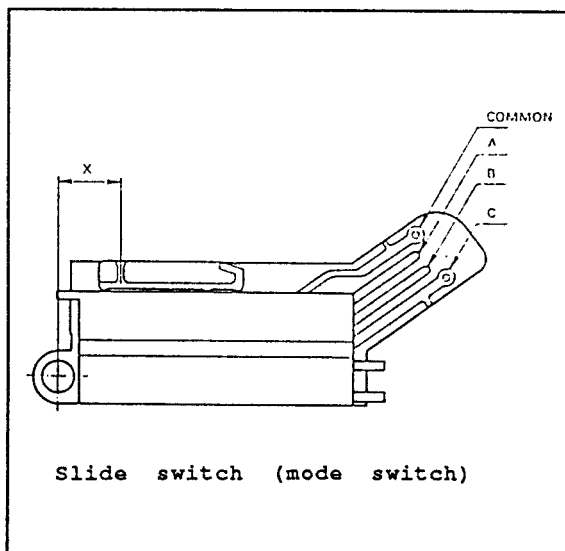


Fig.II-4

Modes	X (mm)	A	B	C
Eject	1.7-2.7	opened	opened	shorted
Blank	2.7-5.7	opened	opened	opened
Load/Unload	5.7-6.7	opened	shorted	shorted
Blank	6.7-8.1	opened	shorted	opened
Stop	8.1-9.1	shorted	shorted	opened
Blank	9.1-12.0	shorted	opened	opened
Play	12.0-13.3	shorted	opened	shorted

Note: "Opened" and "shorted" in the table is versus the COMMON.

Table II-1



## 2. Periodic Check/Confirmation and Notes for Each Mechanism

To maintain the performances of equipment and tape properly, perform the following checks periodically. Also, after repairing, confirm the followings regardless of the length of use hours.

### • Cleaning

#### 2-1 Rotary Drum

- (1) Clean the rotary drum gently with a thick lens tissue (CY9-4023-003) with ethyl alcohol wetted.

When cleaning, rotate the rotary drum counterclockwise gradually by hand.

\*Notes: 1. Do not rotate the motor by using the power source.

2. Do not rotate the drum clockwise.

3. Do not clean the drum except the above procedure.

If the lens tissue with ethyl alcohol soaked is used vertically to head chip, the head chip may be damaged.

#### 2-2 Tape Path

- (1) Clean the tape path (No.1-7 guides, Capstan shaft and Pinch roller) by using a lens tissue with ethyl alcohol soaked. (Fig.II-5)

#### 2-3 Driving System (Timing belt, surface of reel table)

- (1) Clean the timing belt and the reel table by using a lens tissue with ethyl alcohol soaked.

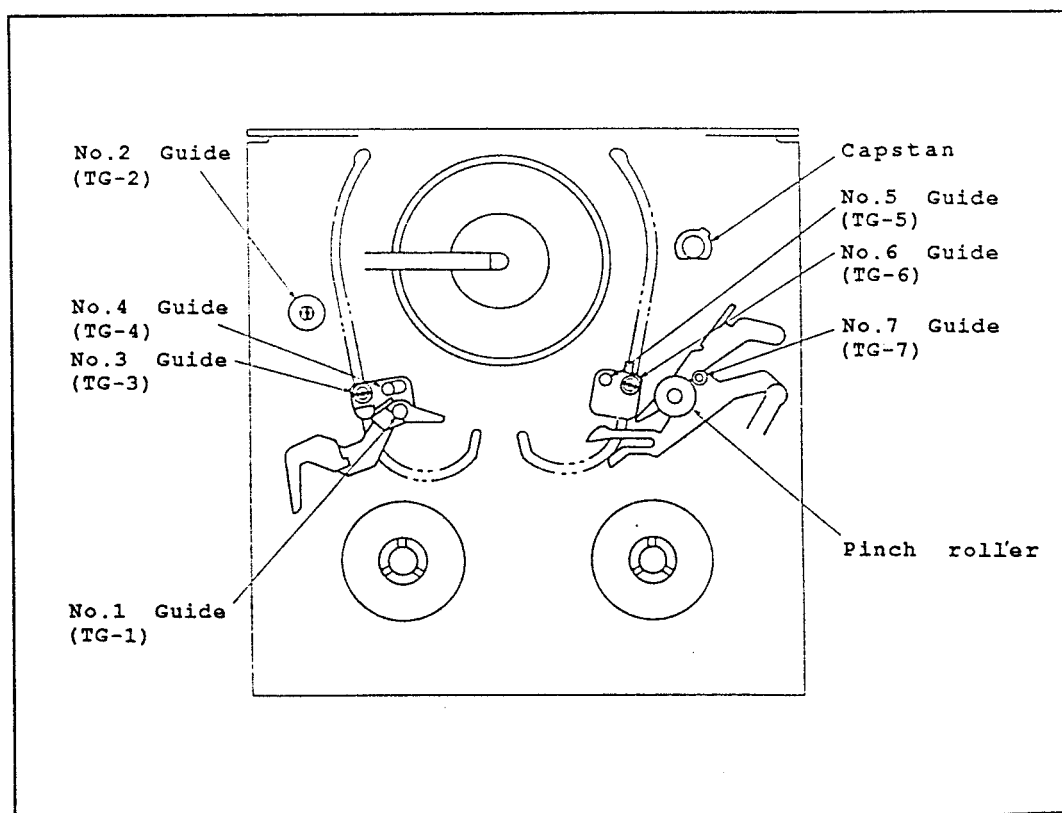


Fig.II-5

## 2-4 Periodic Check/Confirmation Items

When performing periodical Check/Confirmation, refer to the following items.

Check/Confirmation items		Hours of Use(H)										Remarks
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Drum/ Tape Path	Cleaning of tape path surface	○	○	○	○	○	○	○	○	○	○	Be careful for oil
	Cleaning of rotary drum assembly	○	○	○	○	○	○	○	○	○	○	Be careful for oil
Driving Systems	Relay belt	—	☆	—	☆	—	☆	—	☆	—	☆	
	Capstan shaft	—	◎	—	◎	—	◎	—	◎	—	◎	Be absolutely careful not to put oil on the tape path surface.
	Relay pully shaft	—	◎	—	◎	—	◎	—	◎	—	◎	
	Loading motor	—	☆	—	☆	—	☆	—	☆	—	☆	
Confirmation	Abnormal noise	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
	Back tension measurement	—	☆	—	☆	—	☆	—	☆	—	☆	
	Brake system	—	☆	—	☆	—	☆	—	☆	—	☆	
	FWD.RVS torque measurement	—	☆	—	☆	—	☆	—	☆	—	☆	

### Oil and Grease

- (1) "One drop of oil" means the amount which sticks to a 2mm diameter rod, as shown in Fig.II-6.
- (2) Use oil and grease specified below.  
Molyton grease DY9-3009-000  
Hydroflud-NT68 Commercially available (DY9-3010-000).
- (3) For a shaft receiver, be sure to use the oil without dust particles, etc. If the oil with such substances used, a shaft receiver may be damaged by friction, etc..

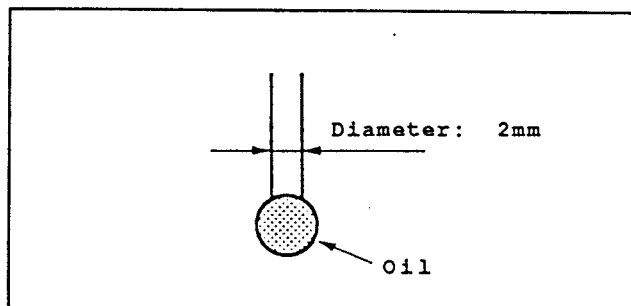


Fig.II-6

### 3 Disassembling/Adjustment for Mechanical Section

#### 3-1 Roller Assembly

- Disassembling (Fig.II-7)

- (1) To dismount the roller assembly ②, removes a screw ①.

- Reassembling (Fig.II-7)

- (1) Install the roller assembly while aligning the two dowels with the two holes ④ at mechanical chassis.
- (2) Secure the roller assembly ② with a screw ①.

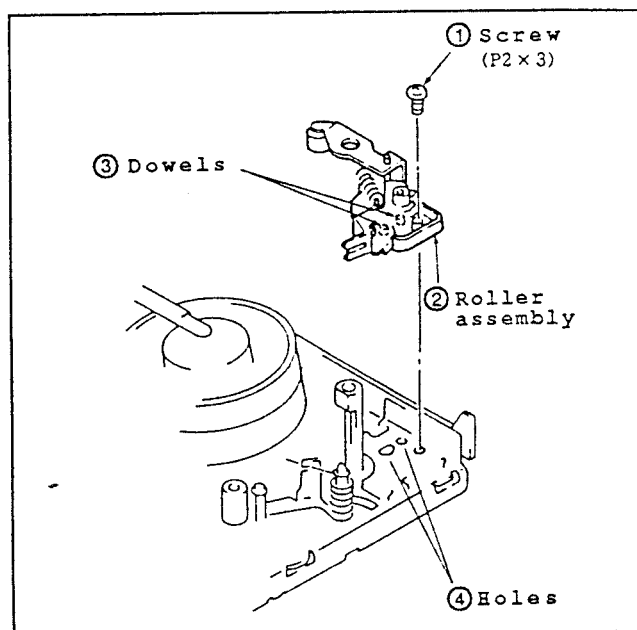


Fig.II-7

#### 3-2 Guide Guard

- Disassembling (Fig.II-8)

- (1) To detach the guide guard, remove a screw ①.

- Reassembling (Fig.II-8)

- (1) Install the guide guard while aligning the dowel ③ with the hole ④.
- (2) Secure the guide guard ② with a screw ①.

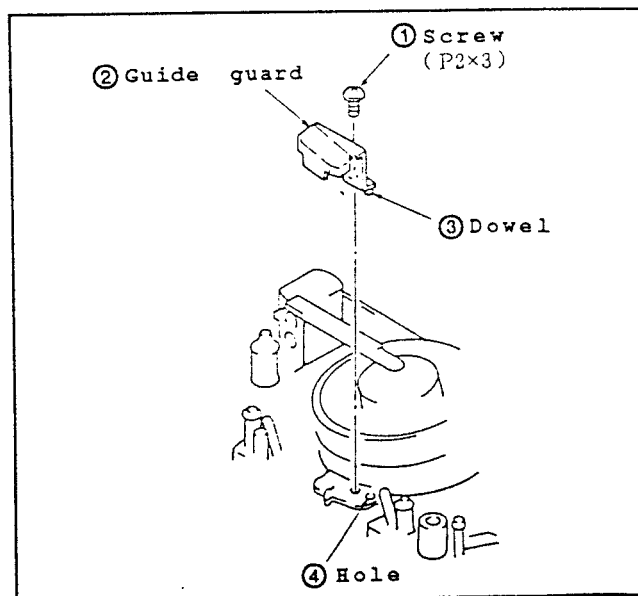


Fig.II-8



### 3-3 Capstan Motor

- Disassembling (Fig.II-9)

- (1) Set the unloading state.
- (2) Rotate the stopper ① in direction ④ until it comes to an end.
- (3) To take out the capstan motor ③, remove the two set screws ②.

- Reassembling (Fig.II-9)

- (1) Align the two dowels ④ with the two holes ⑤ to match the gear section ⑥ with the connecting gear ⑦.
- (2) Secure the capstan motor ③ with the two set screws ②.
- (3) Rotate the stopper ① in direction of ⑧ until it comes to an end.

\*Notes: 1. Do not match the gear section ⑥ and the connecting gear ⑦ forcibly to prevent the cam grooves damaging.  
2. Fit the capstan motor ③ and the chassis without space.  
3. Do not touch the capstan motor shaft, the rotor section and the oil seals.

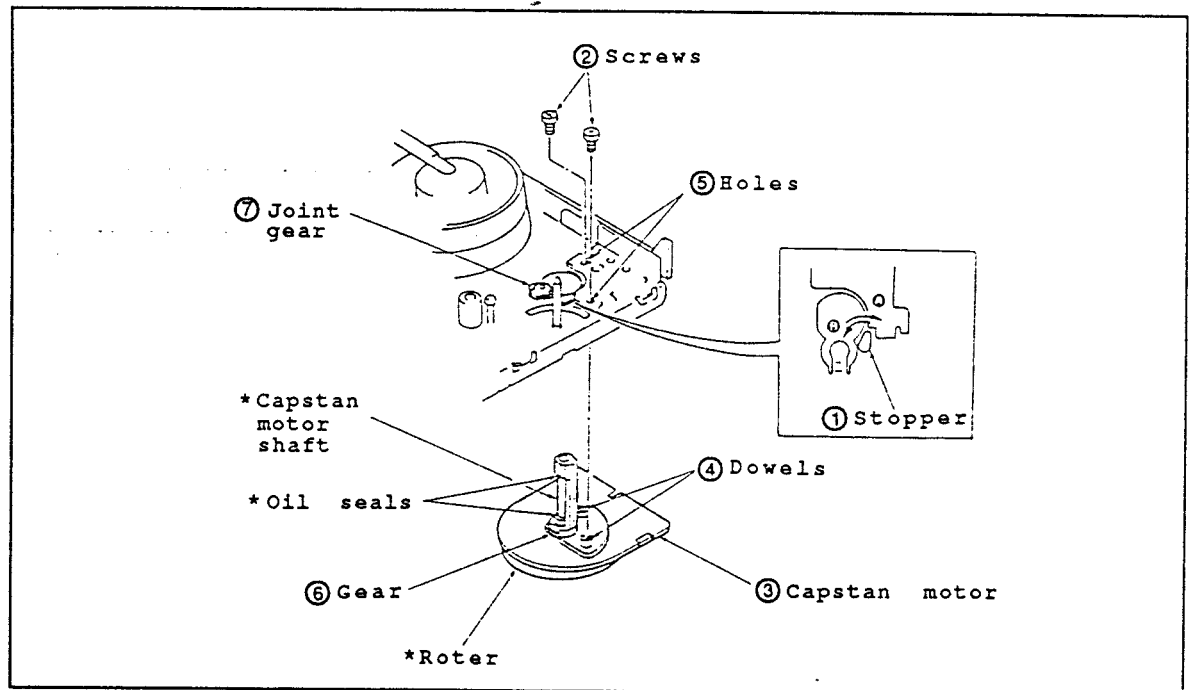


Fig.II-9

### 3-4 S Brake, T Brake

#### • Disassembling (Fig.II-10)

- (1) Remove the spring ①.
- (2) To take out the T brake ③, remove the shaft pin ②.
- (3) To take out the S brake ⑤, remove the shaft pin ④.

\*Note: If the claw part of shaft pin ② and ④ damaged, replace them.

#### • Reassembling (Fig.II-10)

- (1) Install the S brake ⑤ while inserting the gear ⑥ into the notch ⑦.
- (2) Attach the shaft pin ④.
- (3) To install T brake ③, put the shaft ⑧ of T brake ③ into the S reel side comparing the brake releasing arm ⑨. At this time, part ⑩ must be at the drum side comparing part ⑪.
- (4) Attach the shaft pin ②.
- (5) Insert the spring ① under the claw ⑪ of shaft ⑩. Hook the spring ① on the claws ⑫, respectively.

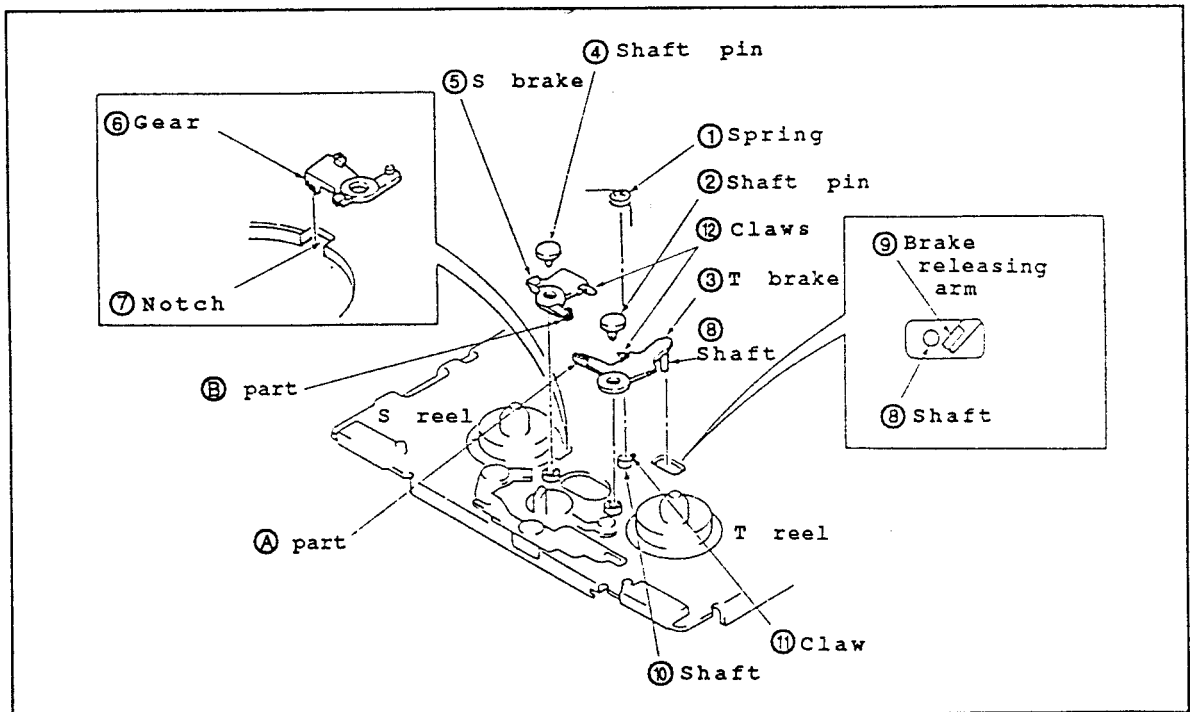


Fig.II-10

### 3-5 LB Brake, LB Lever

- Disassembling (Fig.II-10)

- (1) To take off the TL plate ②, remove the screw ①.
- (2) To take off the LB brake ④, remove the shaft pin ③.
- (3) To take off the LB lever ⑥, remove the shaft pin ⑤.

\*Note: If the claw part of shaft pin ③ and ⑤ damaged, replace them.

- Reassembling (Fig.II-11)

- (1) Assemble the LB lever ⑥ while inserting the LB gear pin ⑦ to the hole of LB lever ⑥. Then, secure it with the shaft pin ⑤.
- (2) Assemble the LB brake ④ while inserting the pin ⑧ to the notch ⑨ of LB lever ⑥ and the gear ⑩ to the notch ⑪.
- (3) Install the shaft pin ③.
- (4) Assemble TL plate ② while aligning the dowel ⑫ and the hole ⑬. Then, secure it with the screw ①.

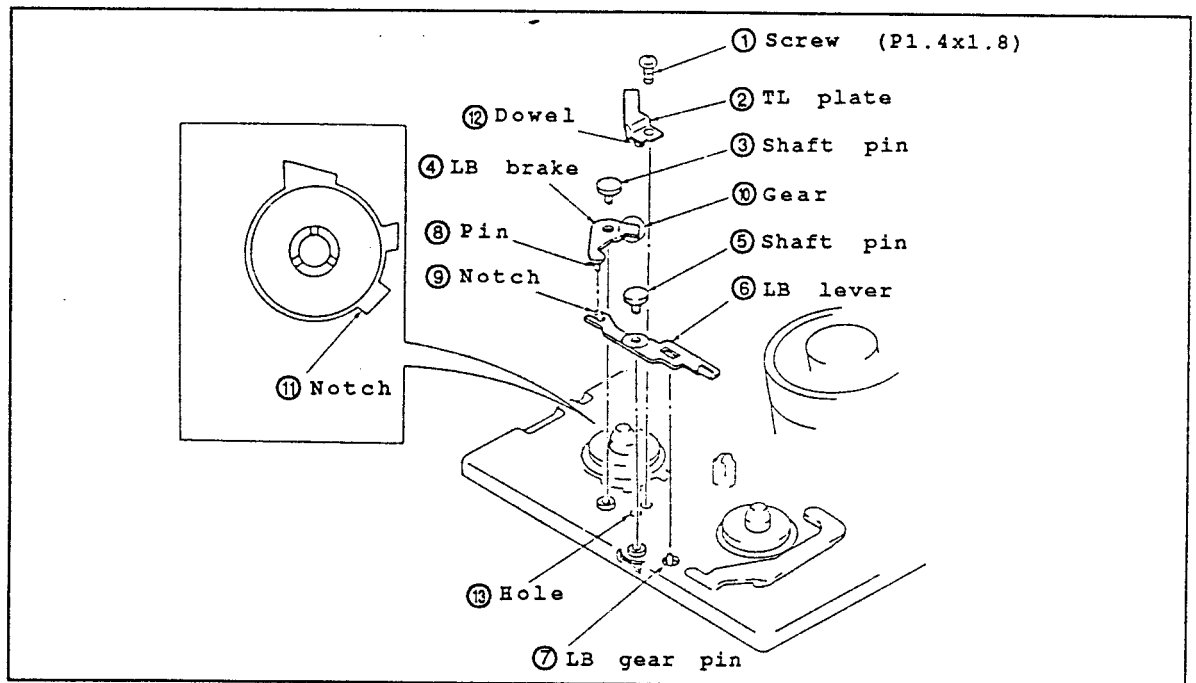


Fig.II-11



### 3-6 LB Releasing Arm

#### • Disassembling (Fig.II-12)

- (1) Take off the LB releasing arm ② while pushing the claw ① in the arrow direction.

#### • Reassembling (Fig.II-12)

- (1) Install the LB releasing arm ② to the shaft ③ while inserting ①, ②, ③ and ④ to the holes ④, respectively. Then, secure it by hooking the claw ①.

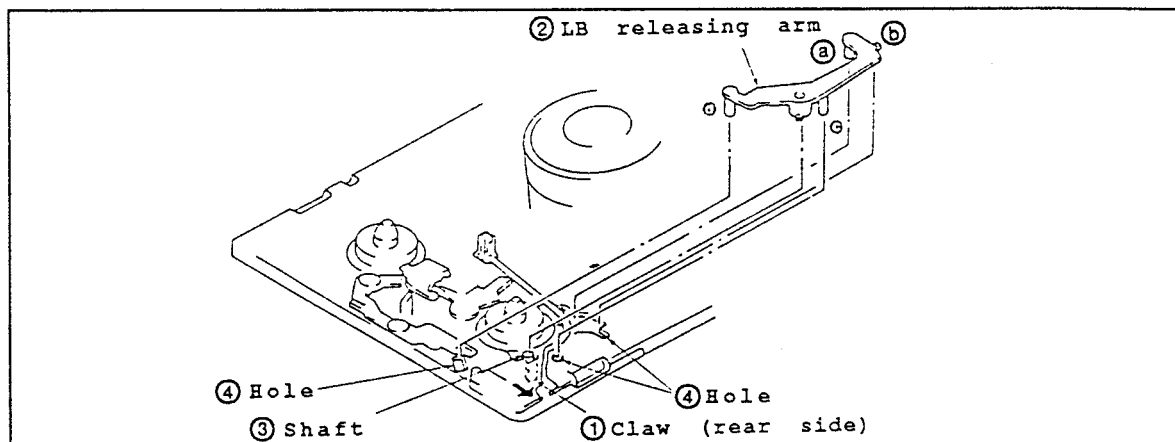


Fig.II-12

### 3-7 RK Stopper, RK Stopper Arm

#### • Disassembling (Fig.II-13)

- (1) Remove the screw ①.
- (2) To take off the RK stopper arm ③, unhook the claw ② of chassis.
- (3) Take off the RK stopper ④.

#### • Reassembling (Fig.II-13)

- (1) Assemble the RK stopper ④ onto the shaft ⑤.
- (2) Assemble RK stopper arm ③ onto the shaft ⑥ while inserting the pin ⑩ to the hole ⑪. Then, secure it by hooking the claw ② to the hole ⑦.
- (3) Install the spring ① to the shaft ⑤. Then, hook it to the claws ⑧ and ⑨, respectively.

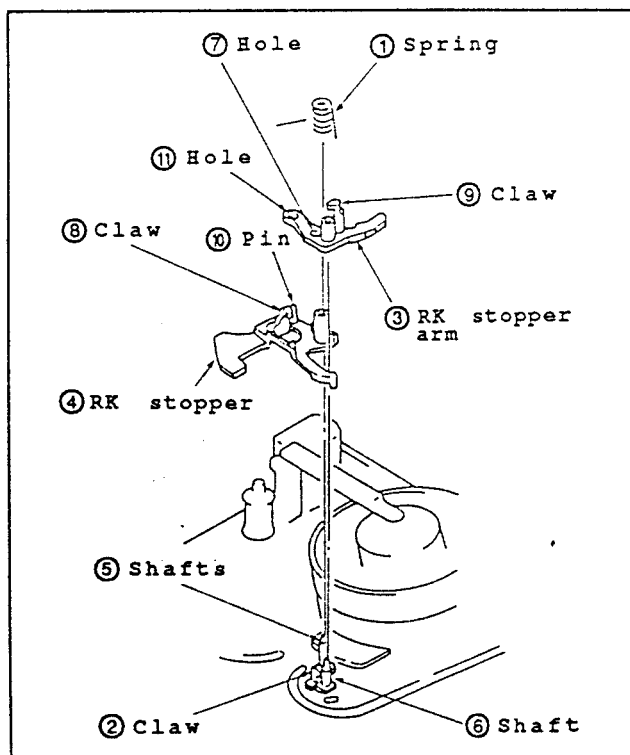


Fig.II-13

### 3-8 Pinch Arm, TG-7 Arm

#### • Disassembling (Fig.II-14)

- (1) Set the unloading state.
- (2) To take off the pinch arm ②, remove the washer ①.
- (3) To detach the TG-7 plate spring ⑤, bend the claw ④ of hole ③ by using a thin screwdriver or equivalent.
- (4) Detach the TG-7 arm.

#### • Reassembling (Fig.II-14)

- (1) Apply the grease on the inside and the bottom surface of the hole ⑦.
- (2) Insert the shaft ⑧ of TG-7 arm ⑥ to the hole ⑦.
- (3) Apply the grease on the shadowed area (a). (Fig.A)
- (4) Insert the TG-7 plate spring ⑤ to the hole ③.  
Then, secure it by hooking the claw ④.
- (5) Apply the 1/2 drop of oil to the shaft ⑨. (Fig.B)
- (6) Insert the pinch arm ② to the shaft ⑨.  
Then, assemble while inserting the pinch sub-arm's cut-up part into the (b) part.
- (7) Secure it with the washer ①.

- \* Notes: 1. Do not apply the grease on the screw ⑪ of TG-7 arm ⑥. (Fig.A)  
 2. Be careful for the TG-7 guide and the rubber part when inserting.  
 3. After reassembled, be sure to perform the tape path adjustment.

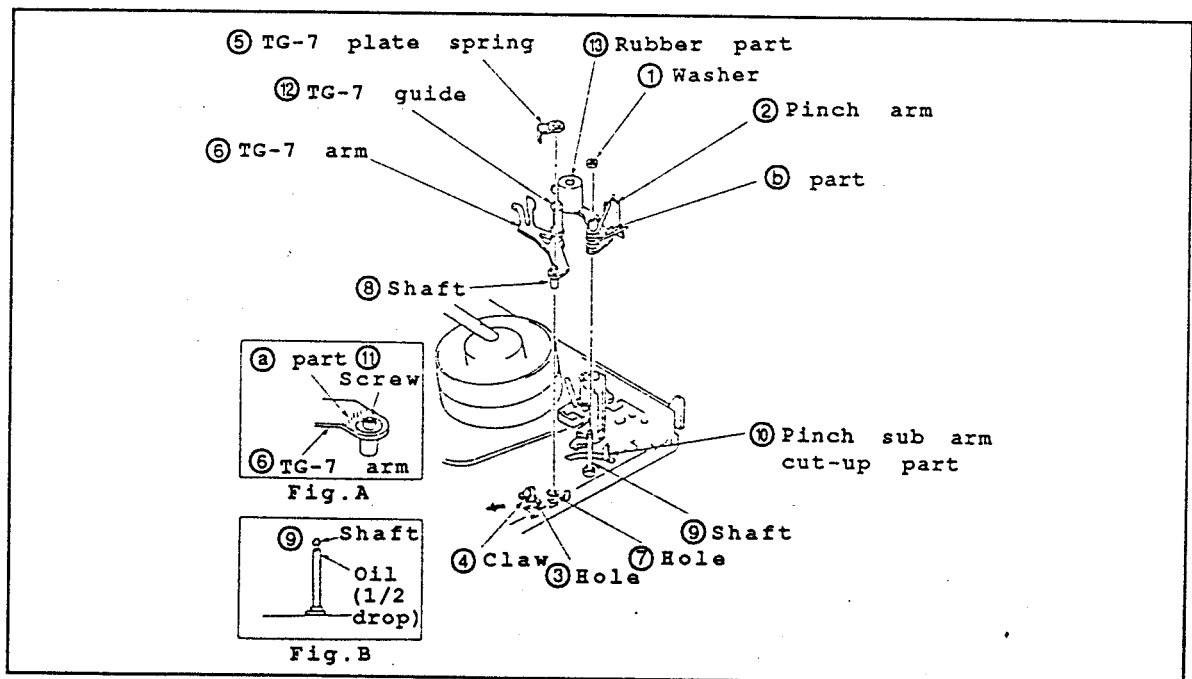


Fig.II-14

• Disassembling (Fig.II-15)

- (1) Take out the TG-2 upper flange ①.
- (2) Take out the TG-2 roller ②, TG-2 sleeve ③, TG-2 lower flange ④ and the coil spring ⑤.

• Reassembling (Fig.II-15)

- (1) Install the coil spring ⑤, TG-2 lower flange ④, TG-2 sleeve ③ and TG-2 roller ② to the shaft.
- (2) Secure the TG-2 upper flange ① to the shaft by turning it four to 6 times.

• Presetting (Fig.II-16)

- (1) Turn the TG-2 upper flange ① to adjust the height between the mechanical chassis surface and the TG-2 upper flange to 18.6mm.

\*Note: After presetting, perform the tape path adjustment.

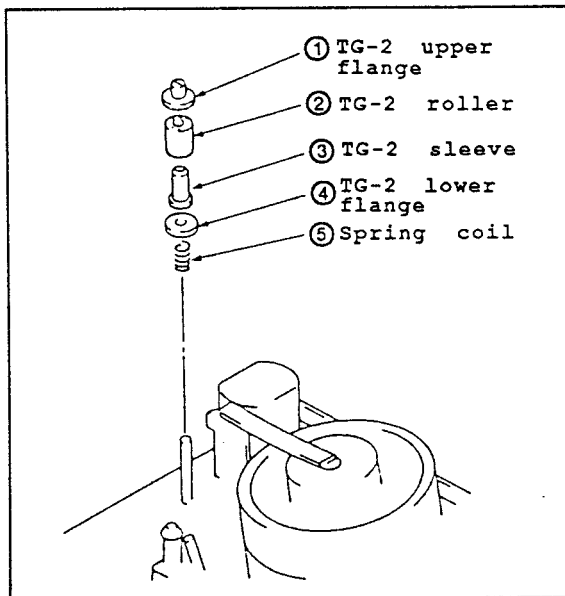


Fig.II-15

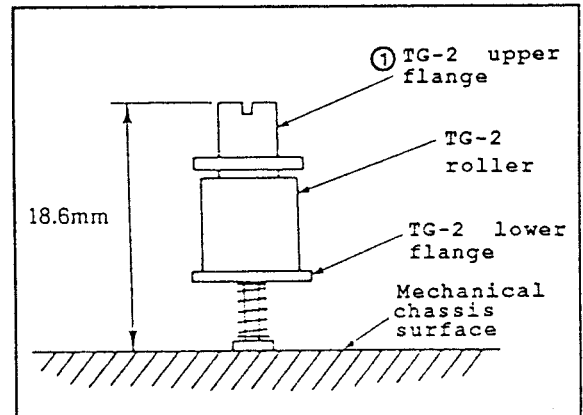


Fig.II-16



### 3-10 S Reel Table, T Reel Table

#### • Disassembling (Fig.II-17)

- (1) In the same procedures in "3-4", dismount the S and T brake.
- (2) In the same procedures in "3-5", detach the TL plate.
- (3) In the same procedures in "3-11", take off the tension regulator band.
- (4) Dismount the S reel table ①.
- (5) Turn the stopper ② in the direction of ① by 90° approximately.
- (6) While shifting the LB releasing arm ③ in the direction of ②, dismount the T reel table.

#### • Reassembling (Fig.II-17)

\*Caution: When mounting S and T reel tables, be careful not to drop the oil onto the reflection plate at the rear side. If the oil dropped, dust particles may put on and it makes the counter inaccurate.

- (1) Apply the 1/2 drop of oil to the shaft ⑤. (Fig.A)
- (2) Rotate RK gear ⑥ to the direction of ③.  
Rotate the TS brake ⑦ to the direction of ④.
- (3) While shifting the LB releasing arm ③ to the direction of ②, mount the T reel table ④ to the shaft ⑤.  
Then, turn the stopper ② to the direction of ① until it comes to an end.
- (4) Apply the 1/2 drop of oil to the shaft ⑧. (Fig.B)
- (5) Rotate the RK gear ⑥ to the direction of ①.  
Rotate the UL brake ⑨ to the direction of ③.  
Rotate the LB brake ⑩ to the direction of ④.
- (6) Mount the S reel table to the shaft ⑧.
- (7) In the same procedures in "3-11", hook up the tension regulator band.
- (8) In the same procedures in "3-5", attach the TL plate.
- (9) In the same procedures in "3-4", mount the S brake and T brake.

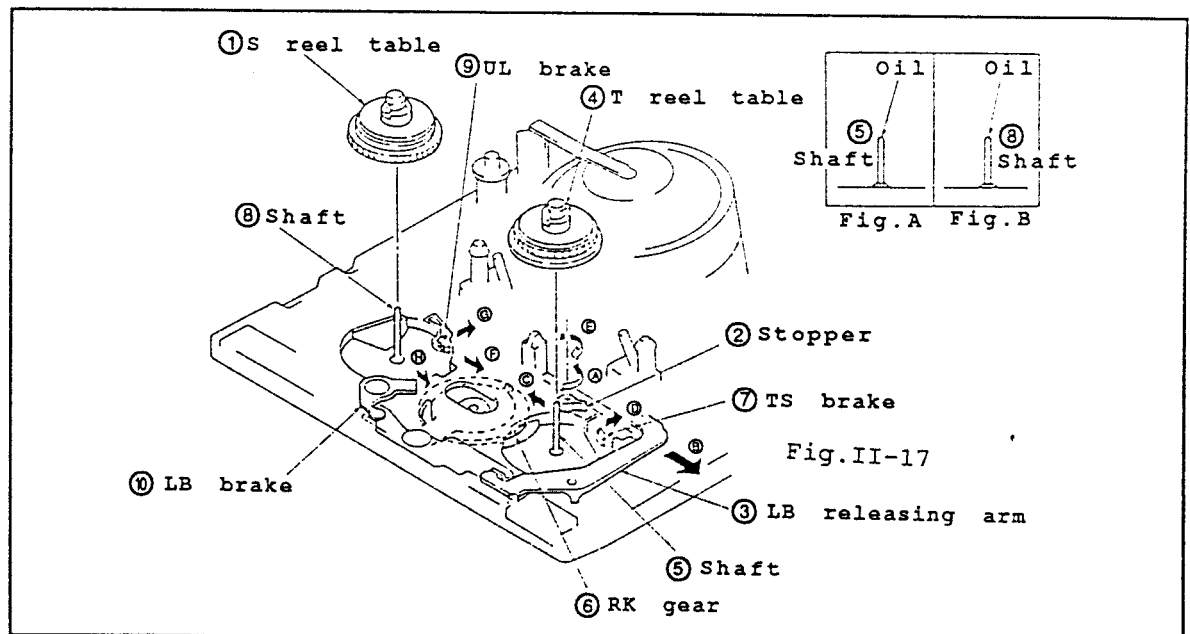


Fig.II-17

### 3-11 Tension Regulator Band/Arm

#### • Disassembling (Fig.II-18)

- (1) In the same procedures in "3-5", detach the TL plate.
- (2) Remove the screw ①.
- (3) Take off the tension regulator band from the shaft ③ of tension regulator arm ② by using a thin screwdriver or equivalent.
- (4) Remove the spring coil ⑤.
- (5) Remove the washer ⑥ from the rear side of mechanical chassis. Then, detach the tension regulator arm ②.
- (6) To detach the adjust arm ⑧, unhook the claw ⑦.

\*Note: When detaching the tension regulator band ④, be careful not to twist or fold it. Also, when detaching it, do not touch the felt side ⑨ and drop the oil.

#### • Reassembling (Fig.II-18)

- (1) Mesh the adjust arm ⑧ with the position indicated in the Fig. A, then, hook the claw ⑦.
- (2) Apply the 1/2 drop of oil to the hole ⑩.
- (3) Attach the tension regulator arm ② to the slot ⑪ while inserting a part inside of switch lever a'ssy. (A indicated by an arrow.) (Fig.B)
- (4) While pressing the tension regulator arm ② from the front side of chassis, secure it with a washer ⑥ from the rear side.
- (5) Hook the spring coil ⑤ to the adjust arm ⑧ and the tension regulator arm ②, respectively. The direction of coil is as indicated in the Fig.
- (6) Attach the tension regulator band ④ to the shaft ③ of the tension regulator arm ② while fitting the felt side ⑨ onto the shadow area of S reel table ⑫.
- (7) Assemble the tension regulator plate ⑬ of the tension regulator band ④ while aligning it with the dowel ⑭ of chassis. Then, secure it with the screw ①.
- (8) In the same procedures in "3-5", attach the TL plate.
- (9) In the same procedures in "3-21", perform the tension regulator adjustment.
- (10) In the same procedures in "3-22", perform the back tension adjustment.

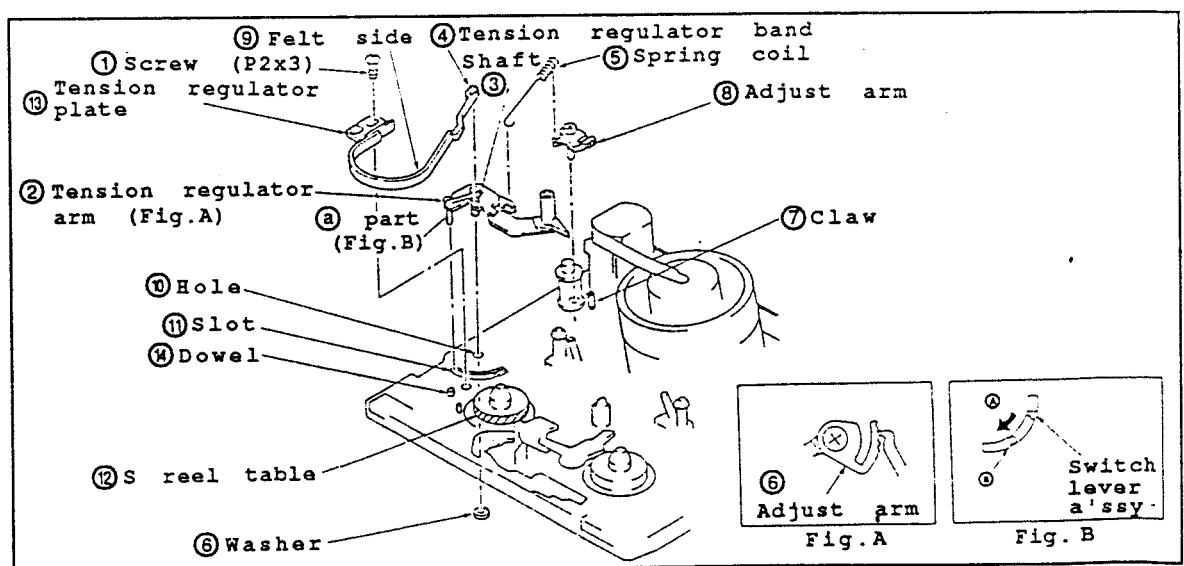


Fig.II-18

### 3-12 Drum Unit, Dew Sensor

#### • Disassembling (Fig.II-19)

- (1) Set unloading state.
- (2) Unplug the flexible connector ① and the connectors ②.
- (3) In the same procedures in "3-2", detach the guide guard.
- (4) To detach the earth terminal ④, remove the screw ③.
- (5) To dismount the drum ⑥ from the chassis, remove the three setscrews ⑤.
- (6) Disconnect the connector ⑩.
- (7) To detach the dew sensor ⑧, remove the screw ⑦.

#### • Reassembling (Fig.II-19)

- (1) Mesh the ② part of dew sensor ⑧ with the notch ⑪. Then, secure them with the screw ⑦.
- (2) Attach the connector ⑩.
- (3) Put the harness ⑤ of dew sensor ⑧ under the claw ⑫. (Fig.A)
- (4) Insert the connectors ② and the flexible connector ① into the chassis' hole ⑬.
- Then, mount the drum while aligning the dowels ⑭, and secure it with the screws ⑤.
- (5) While aligning the earth terminal ② with the chassis' two dowels ⑭, secure it with the screw ③.
- (6) In the same procedures in "3-2", attach the guide guard.
- (7) Attach two connectors ② and the flexible connector ① to the C.B.A..

\*Notes: 1. Be careful not to flaw the head chip ⑨ and the tape path surface of drum ⑥.  
2. After reassembling, perform the tape path adjustment.

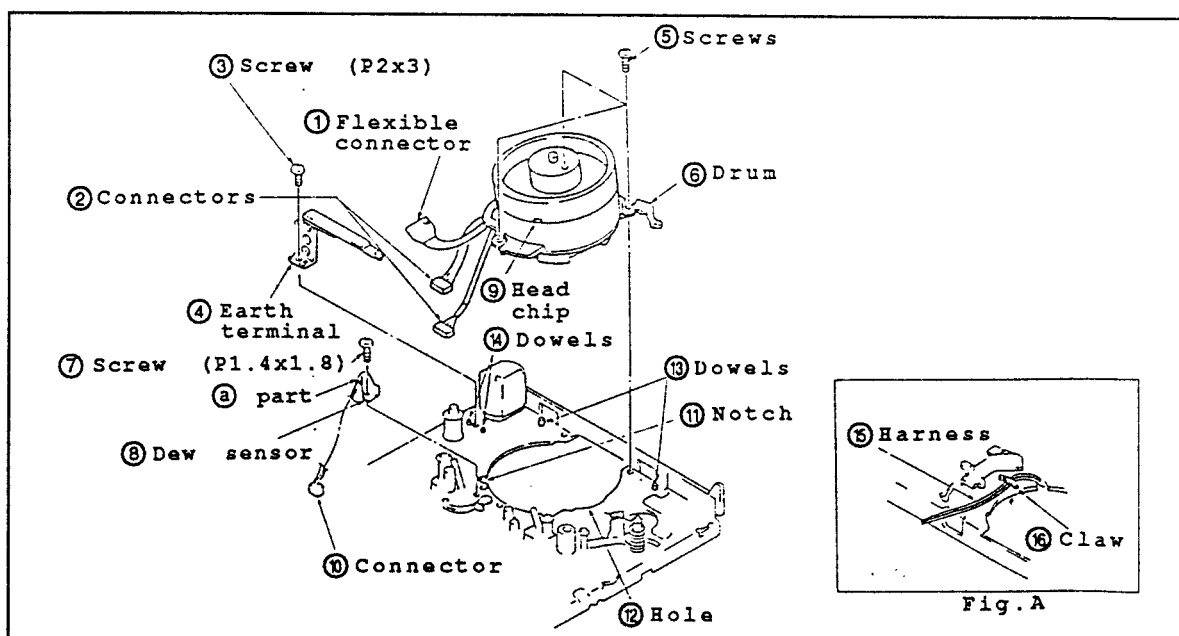


Fig.II-19



### 3-13 Eject Lever, Switch Lever, Pinch Sub Arm

#### • Disassembling (Fig.II-20)

- (1) Set unloading state.
- (2) In the same procedures in "3-3", dismount the capstan motor.
- (3) To dismount the eject lever ②, unhook the claw ①.
- (4) To detach the switch lever ④, remove the washer ③.
- (5) Remove the spring ⑤.
- (6) To detach the pinch sub arm ⑦, remove the washer ⑥.

#### • Reassembling (Fig.II-20)

- (1) Apply the grease onto the shaft ⑧. (Fig.A)
- (2) Assemble the pinch sub arm ⑦ while inserting the ⑨ part into the slot ⑨.
- (3) Secure it with the washer ⑥.
- (4) Hook the ⑥ part of spring ⑤ between the claw ⑫ and the chassis side while hooking ③ part to the claw ⑫.
- (5) Apply 1/2 drop of oil to the shaft ⑬. (Fig.B)
- (6) Assemble the switch lever ④ to the shaft ⑬ while aligning the groove ⑭ with the projection ⑮ of mode switch. At this time, insert the pin ⑯ to the outside groove ⑰ of drive gear (left) ⑰.
- (7) Secure it with a washer ③.
- (8) Attach the eject lever ② and hook the claw ①.
- (9) In the same procedures in "3-3", mount the capstan motor.

\*Note: When installing the switch lever ④ to the shaft ⑬, set the pin ⑯ of tension regulator arm to the inside of switch lever ④. (within the extent of ① indicated by an arrow.)

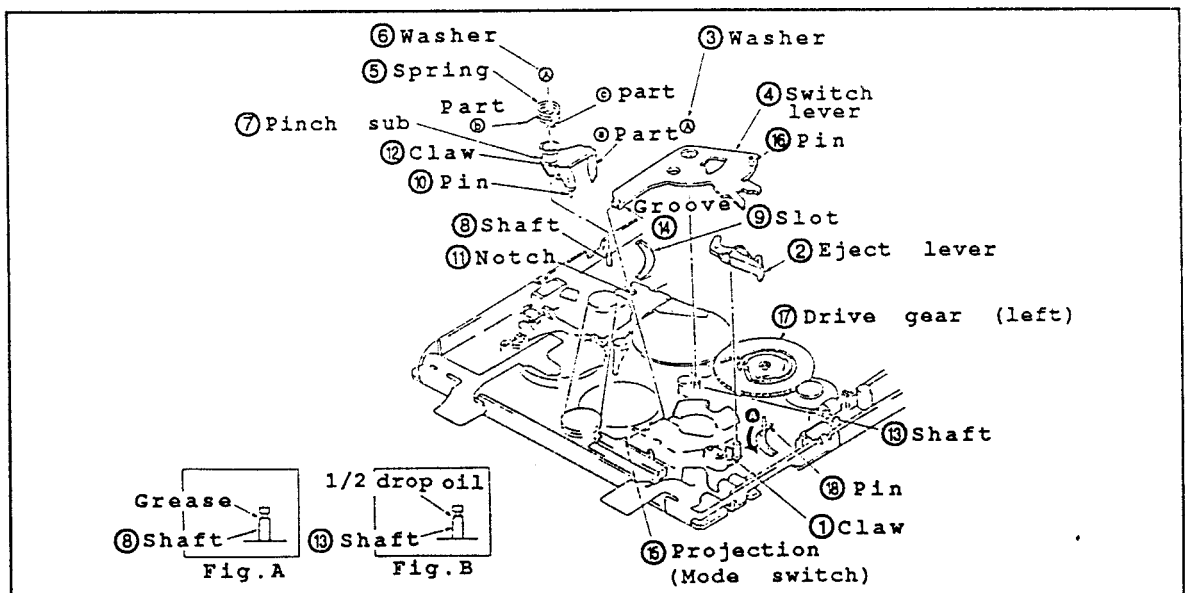


Fig.II-20

### 3-14 Timing Belt (L), RC Gear, Loading Lever, Timing Belt(S), Joint Gear

#### • Disassembling (Fig.II-21)

- (1) Set unloading state
- (2) In the same procedures in "3-3", dismount the capstan motor.
- (3) In the same procedures in "3-13", detach the pinch sub arm.
- (4) Remove the washer ①. Then dismount the RC gear ② (with the timing belt (L) ③ hooked) from the shaft ④.
- (5) Remove the washer ⑥. Then, detach the loading lever ⑧ while pushing the claw ⑦ toward the direction A.
- (6) Turn the stopper ⑨ toward the direction B by 90°.
- (7) Detach the joint gear ⑪ (with the timing belt(S) ⑩ hooked) from the shaft ⑫.
- (8) Separate the timing belt(S) ⑩ from the relay pulley ⑤.

\*Note: When dismounting the gear ⑪, do not touch the flange B part. (Fig.D)

#### • Reassembling (Fig.II-21)

- (1) Apply 1/2 drop of oil to the shaft ⑫. (Fig.F)
- (2) Hook the timing belt(S) ⑩ to the joint gear ⑪, and then to the gear C of relay pulley ⑤ (Fig.E).
- (3) Attach the joint gear ⑪ to the shaft ⑫ with the timing belt(S) ⑩ attached.
- (4) Turn the stopper ⑨ toward the C direction until it comes to an end.
- (5) Apply 1/2 drop of oil to the shaft ⑫. (Fig.A)
- (6) Insert the loading lever ⑧ into the shaft ⑫. Then, match the A part with the claw ⑦ and insert the pin ⑬ into the groove of drive gear (right) ⑭.
- (7) Secure the washer ⑥.
- (8) Hook the timing belt(L) ③ to the gear as indicated in the Fig.B, and to the gear C of the relay pulley ⑤. (Fig.E)
- (9) Mount the RC gear ② to the shaft ④ (with the timing belt(L) ③ attached). Then, mesh it with the RK gear ⑮.
- (10) Secure the washer ①.
- (11) Apply the grease to the position of loading lever ⑧ as indicated in Fig.C.
- (12) In the same procedures "3-14" and "3-3", assemble the pinch sub arm and the capstan motor.

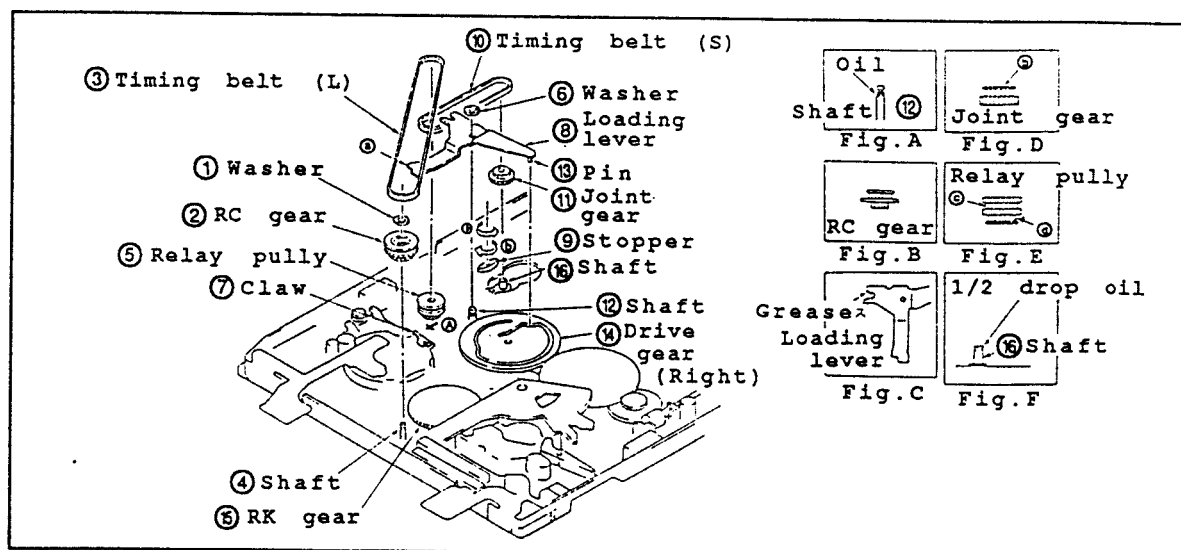


Fig.II-21

### 3-15 Relay Pully, TS Brake, LB Gear, RK Gear

#### • Disassembling (Fig.II-22)

- (1) Set unloading state.
- (2) In the same procedures in "3-3", dismount the capstan motor.
- (3) In the same procedures in "3-13", detach the switch lever.
- (4) In the same procedures in "3-14", detach the timing belt(L), the RC gear, the loading lever, the timing belt (S) and the joint gear.
- (5) To take off the relay pully ②, remove the washer ①.
- (6) To detach the TS brake ④, unhook the claw ③.
- (7) Remove the spring ⑤.
- (8) To detach the LB gear ⑦, remove the washer ⑥.
- (9) Detach the RK gear ⑧.

\*Note: When taking off the relay pully ②, do not touch the flange part ④.  
(Fig.C)

#### • Reassembling (Fig.II-22)

- (1) Apply the 1/2 drop of oil to the shaft ⑨. (Fig.A)
- (2) Install the RK gear ⑧ to the shaft ⑨ longitudinally.
- (3) Apply the 1/2 drop of oil to the shaft ⑩. (Fig.B)
- (4) Install the LB gear ⑦ to the shaft ⑩. Then secure it with the washer ⑥.
- (5) Put the spring into the shaft ⑪. Then, hook it to the notch ⑫, and cut-up part ⑬.
- (6) Assemble the TS brake ④, and hook the claw ③.
- (7) Apply the 1/2 drop of oil to the shaft ⑭. (Fig.D)
- (8) Attach the relay pully ② to the shaft ⑭, and secure it with the washer ①.
- (9) In the same procedures in "3-14", attach the timing belt(L), the RC gear, the loading lever, the timing belt(S) and the joint gear.
- (10) In the same procedures in "3-13" and "3-3", install the switch lever and the capstan motor.

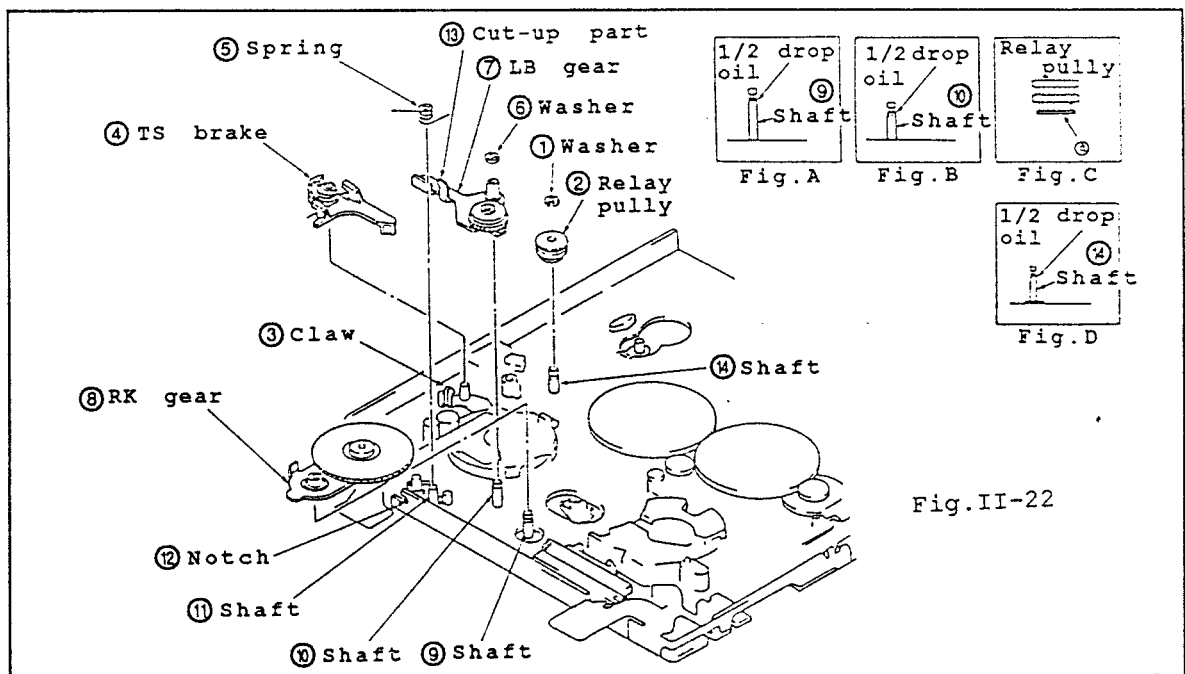


Fig.II-22



### 3-16 UL Gear, UL Brake, UL Arm, LB Plate spring

#### • Disassembling (Fig.II-23)

- (1) In the same procedure in "3-13", detach the switch lever.
- (2) To take off the UL gear ②, remove the washer ①.
- (3) Detach the UL arm ③, the washer ④ and the LB plate spring ⑤.
- (4) Take off the UL brake ⑥.

#### • Reassembling (Fig.II-23)

- (1) Install the UL brake ⑥.
- (2) Apply the 1/2 drop of oil to the shaft ⑦. (Fig. A)
- (3) As shown in the Fig.B, attach the LB plate spring ⑤ to the shaft ⑦. Then, attach the washer ④.
- (4) While matching the projection ⑧ with the groove ⑨ of UL brake ⑥, install UL arm ③ to the shaft ⑦.
- (5) Attach the UL gear ② to the shaft ⑦. Then, mesh it with drive gear (left) ⑩.
- (6) Secure it with the washer ①.
- (7) In the same procedures in "3-13", install the switch lever.

\*Note: To prevent the LB plate spring ⑤ damaging, do not secure the washer ① forcibly.

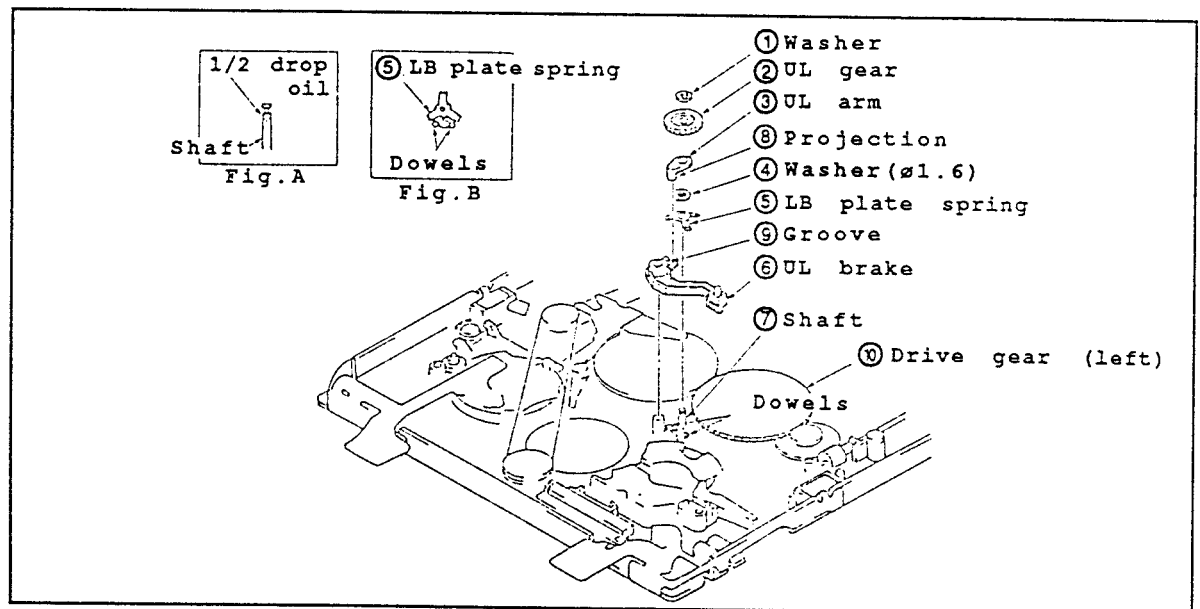


Fig.II-23

### 3-17 Coaster (Right), Drive Gear (Right)

#### • Disassembling (Fig.II-24)

- (1) In the same procedures "3-3" and "3-12", dismount the capstan motor and the drum unit.
- (2) In the same procedures in "3-14", take off the loading lever.
- (3) Set STOP mode.
- (4) To take off the coaster plate spring ② and the coaster (Right) ③, remove the screw ①.
- (5) To detach the plate TT ⑤, remove the two screws ④.
- (6) To dismount the drive gear (Right) ⑦, remove the washer ⑥ (ø1.5).

#### • Reassembling (Fig.II-24)

\*Caution: Do not turn the tilt adjusting screw ③ of coaster (Right). (Repair parts have been already adjusted.)

- (1) Apply the grease to the indicated positions of chassis as shown in Fig.A.
- (2) Apply the 1/2 drop of oil to the shaft ⑧. (Fig.F)
- (3) Apply the grease onto the pin ⑨, the shaft ⑩ and the dowel ⑪ of coaster (Right) ③.
- (4) Assemble the pin ⑨ and the shaft ⑩ aligning the slot ⑪ of chassis.
- (5) Put the brake releasing arm ⑫ to the arrowed direction ⑬.
- (6) Install the drive gear (Right) ⑦ to the shaft ⑧. Then, mesh it with the drive gear (Left) ⑬ while aligning each phases as shown in Fig.B.
- (7) Align ⑭ with ⑮, the hole ④ with the pin ⑨ of coaster (Right) ③, respectively.
- (8) Secure the washer ⑥ (ø1.5).
- (9) Assemble the coaster plate spring ② while aligning the shaft ⑩ (coaster ③) with the pin ⑨. Then, secure it with the screw ①. (Torque: 500g/cm approx).
- (10) Assemble the plate TT ⑤ aligning with the dowel ⑪. Then, secure it with the two screws ④ in numerical order.
- (11) Apply the grease to the positions indicated in the Fig.C and E.
- (12) In the same procedures in "3-14", install the loading lever.
- (13) In the same procedures in "3-12" and "3-3", mount the drum unit and the capstan motor.

\*Note: After reassembling, perform the tape path adjustment.

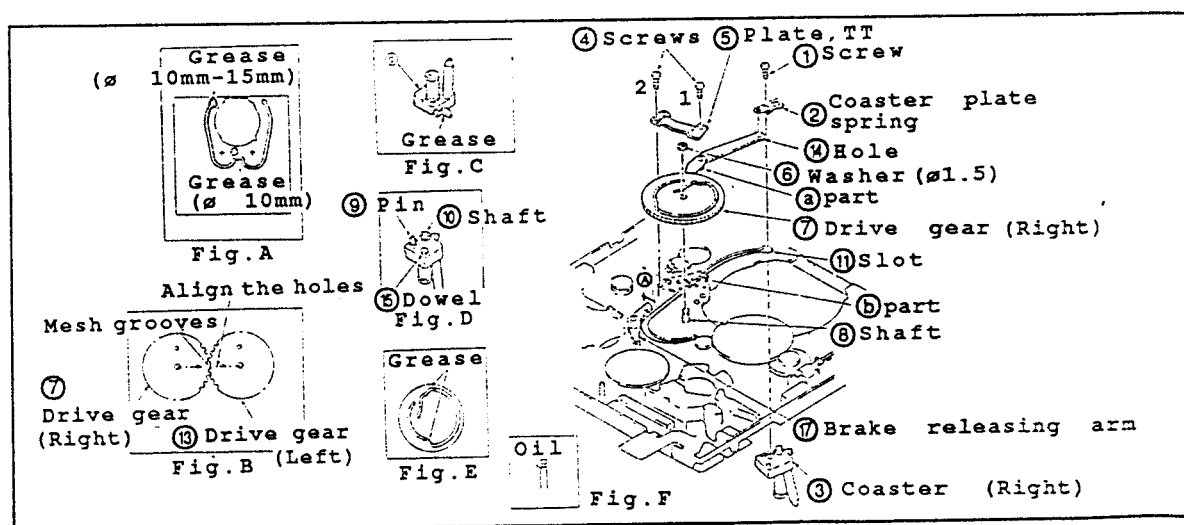


Fig.II-24

### 3-18 Coaster (Left), Drive Gear (Left)

#### • Disassembling (Fig.II-25)

- (1) In the same procedures in "3-3" and "3-12", dismount the capstan motor and the drum unit.
- (2) In the same procedures in "3-13" and "3-14", detach the switch lever, and the loading lever.
- (3) In the same procedures in "3-17", detach the coaster (Right) and the drive gear (Right).
- (4) To take off the coaster plate spring ② and the coaster (left) ③, remove the screw ①.
- (5) To detach the plate SS ⑤, remove the two set screws ④.
- (6) To take off the drive gear (Left) ⑦, remove the washer ⑥ (ø1.5).

#### • Reassembling (Fig.II-25)

- (1) Apply the grease onto the indicated positions of chassis in the Fig.A.
- (2) Apply the 1/2 drop of oil onto the shaft ⑧. (Fig.E)
- (3) Apply the grease onto the pin ⑨, the shaft ⑩ and the dowel ⑬ of coaster (Left) ③. (Fig.B)
- (4) Assemble the pin ⑨ and the shaft ⑩ aligning the slot ⑪.
- (5) Insert the driver gear (Left) ⑦ into the shaft ⑩ while meshing with the wheel gear ⑫ and the UL gear ⑭.
- (6) Align ⑧ part with the slot ⑪, and the hole ② with the pin ⑨ of coaster (Left) ③.
- (7) Secure it with the washer ⑥ (ø1.5).
- (8) Install the coaster plate spring ② while aligning the shaft ⑩ and the pin ⑨ of coaster (Left) ③. Then, secure it with the screw ①. (Torque: 500g/cm, approx)
- (9) Attach the plate SS ⑤ while aligning with the dowel ⑬. Then, secure it the two screws ④ in numerical order.
- (10) Apply the grease onto the positions indicated in the Fig.C and D.
- (11) In the same procedures in "3-17", install the coaster (Right) and the drive gear (Right).
- (12) In the same procedures in "3-14" and "3-13" install the loading lever and the switch lever.
- (13) In the same procedures in "3-12" and "3-3", install the drum unit and the capstan motor.

\*Note: After reassembling, perform the tape path adjustment.

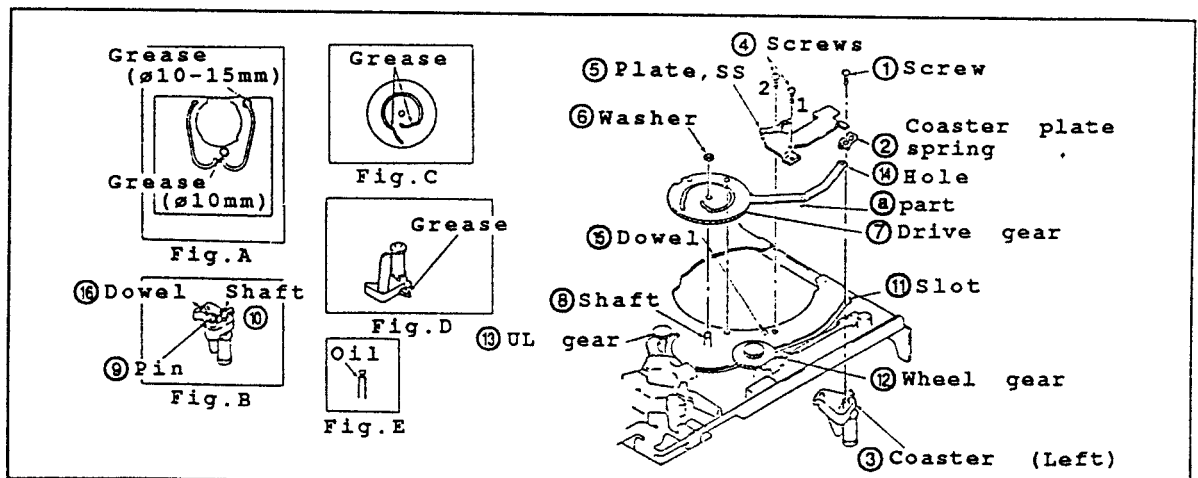


Fig.II-25



### 3-19 Loading Motor, Worm Assembly, Wheel Gear, Brake Releasing Arm

#### • Disassembling (Fig.II-26)

- (1) In the same procedures in "3-3" and "3-13", dismount the capstan motor and the switch lever.
- (2) In the same procedures in "3-14", detach the loading lever.
- (3) In the same procedures in "3-17" and "3-18", detach the drive gears (Right) and (Left).
- (4) To dismount the loading motor ②, remove the two screws ①.
- (5) Take off the brake releasing arm ③.
- (6) To take off the wheel gear ⑤, remove the washer ④.
- (7) Unhook the six claws ⑦ of worm a'ssy..

#### • Reassembling (Fig.II-26)

- (1) Install the worm a'ssy ⑥ while hooking the six claws ⑦.
- (2) Apply the grease to the five shadow areas of worm a'ssy indicated in the Fig.A.
- (3) Apply the 1/2 drop of oil to the shaft ⑧. (Fig.B)
- (4) Insert the wheel gear ⑤ into the shaft ⑧, and mesh it with the worm a'ssy's gear.
- (5) Assemble the brake releasing arm ③.
- (6) Apply the grease onto the entire surface of loading motor gear part.
- (7) Align the loading motor ② with the chassis. Then, secure them with the two screws ①.
- (8) In the same procedures in "3-18" and "3-17", install the drive gears (Left) and (Right).
- (9) In the same procedures in "3-14", install the loading lever.
- (10) In the same procedures in "3-13" and "3-3", install the switch lever and the capstan motor.

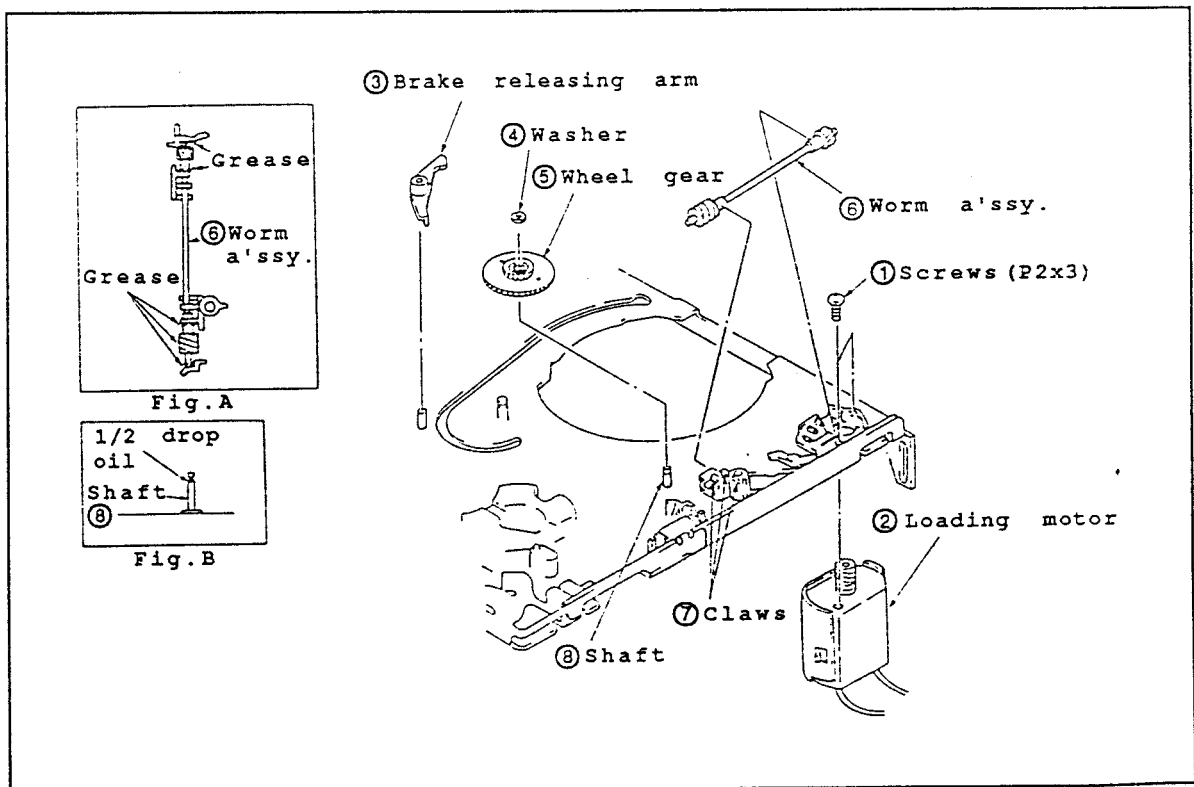


Fig.II-26

### 3-20 Rotary Upper Drum

#### • Disassembling

Note: If recordable, perform re-cording before disassembling.

- (1) Unsolder three solderings (a). Then, confirm that the terminals which come out from the hole of C.B.A. can be moved freely. (Fig.II-27)
- (2) Remove the two setscrews (1).
- (3) Secure the jig (4) to the drum with the two setscrews (2). (Setscrews supplied with jig (4) as a set.) Then, screw in the hexagonal bolt (3) into the hole of jig (4) to dismount the rotary upper drum (5). (Fig.II-28)

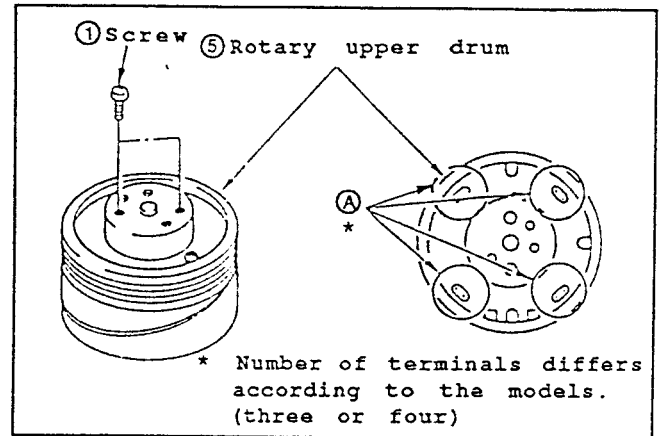


Fig.II-27

#### • Reassembling

- (1) Clean the flange surface and the rotary upper drum (5) surface which faced the flange surface. Check that there is no dust particles and flaws.
- (2) Insert the jig (7) into the drum positioning holes of upper/lower rotary drum. (Fig.II-29)

\*Note: At this time confirm that the terminals (8) come out from the holes of the rotary upper drum C.B.A..

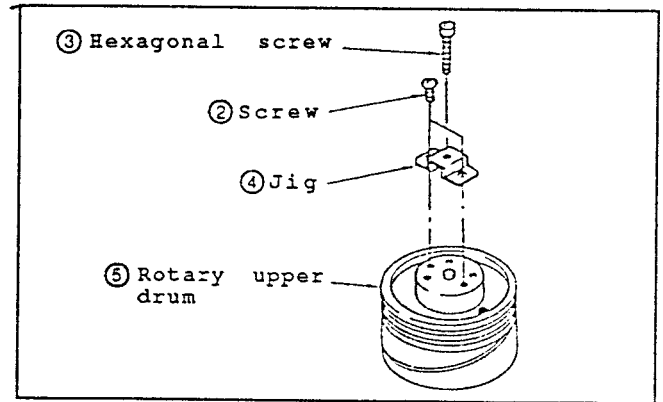


Fig.II-28

- (3) Pull out the jig (7), and then push the rotary upper drum (5) into the lower one manually and gently. If it cannot be set completely to the bottom, Tighten the two setscrews (1) alternately and temporarily. (Fig.II-27)
- (4) Insert the jig (7) into the positioning holes (6) again. If it cannot be inserted smoothly, loosen the two setscrews (1). Then perform the step (3) of disassembling procedure.
- (5) Tighten the two setscrews (1) thoroughly.
- (6) Solder the terminals (a). (Fig.II-27)

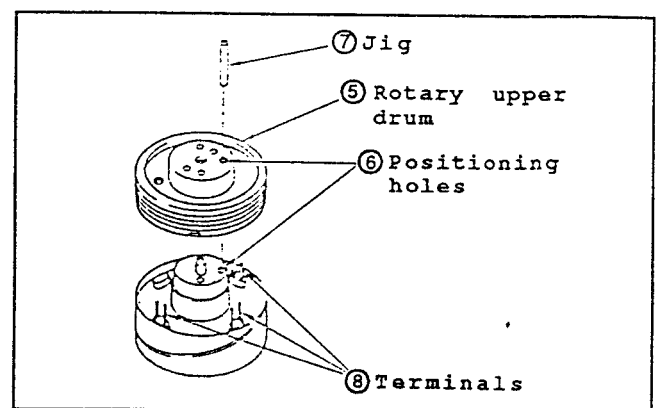


Fig.II-29

\*Notes: 1. When soldering, be careful not to let the solder flow to the C.B.A..

2. After reassembling, perform the tape path adjustment.

### 3-21 Tension Regulator Position Adjustment (Fig.II-30)

- (1) Set the cassette tape, and set it to PLAY mode.
- (2) Check that the distance between ② part of tension regulating arm ① and the groove ② of chassis is within  $1.1 \pm 0.3\text{mm}$ . If it is not the specified distance, perform the following adjustment (from step (3)) without the cassette tape.
- (3) Loosen the screw ④ of tension regulating plate ⑤.
- (4) If the distance measured in step (2) is more than specified, slide the plate ⑤ in the direction of arrow A. If it is less than the specified distance slide it in the direction of arrow B. After sliding, secure it with the screw ④.
- (5) For checking, perform the steps (1) and (2).

\*Notes: 1. Use the cassette tape which is forwarded to about the middle section.  
 2. The trail of left coaster on the groove ② of chassis:  
 1.1mm(approx.)

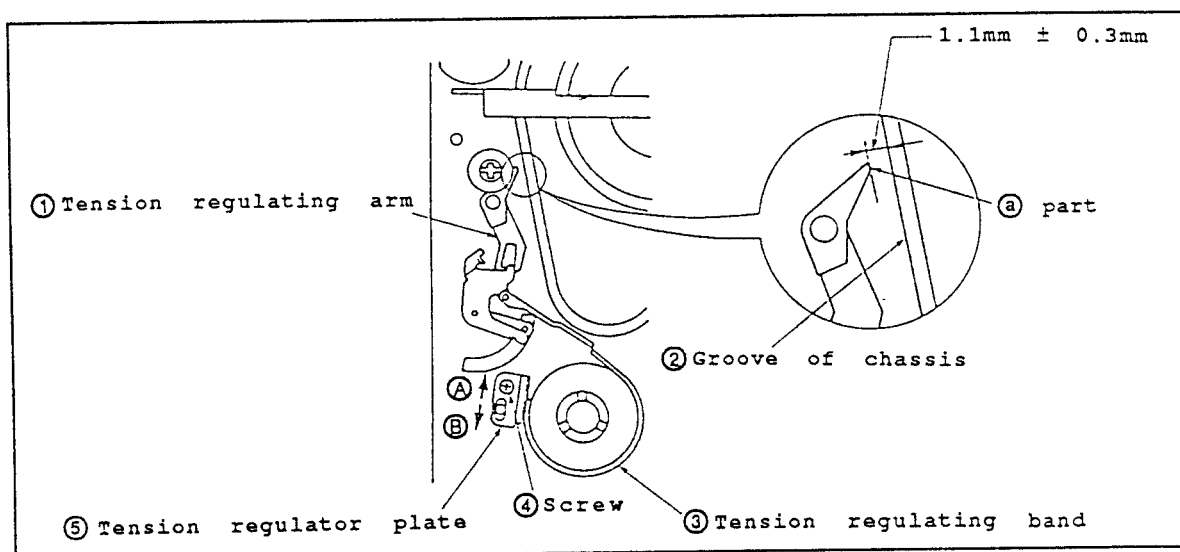


Fig.II-30

### 3-22 Back Tension Adjustment (Fig.II-31)

- (1) Set the cassette torque gauge (DY9-1047-000)
- (2) Set PLAY mode.  
 Confirm that the torque at S reel table is 9-13 g/cm.
- (3) If not, adjust the adjust arm ①.

### 3-23 T Reel Table Torque Check

- (1) Set the cassette torque gauge (DY9-1047-000)
- (2) Set PLAY mode.  
 Confirm that the torque at T reel table is 7-15 g/cm.
- (3) Set REV mode.  
 Confirm that the torque at T reel table is 13-25 g/cm.

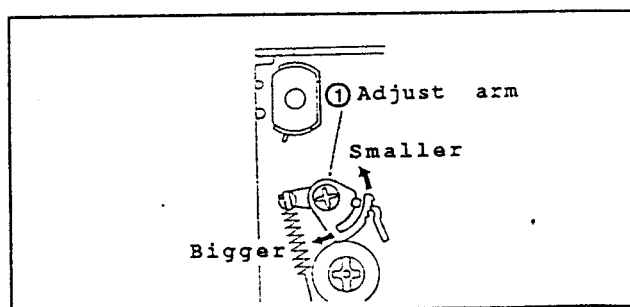


Fig.II-31



#### 4. Tape Path Adjustment

(Notes for No.7 Guide only)

As the height adjusting screw for No.7 guide is located apart from the No.7 guide. So, to adjust the No.7 guide while watching the state of tape, modify the cassette tape as shown in the Fig.II-32.

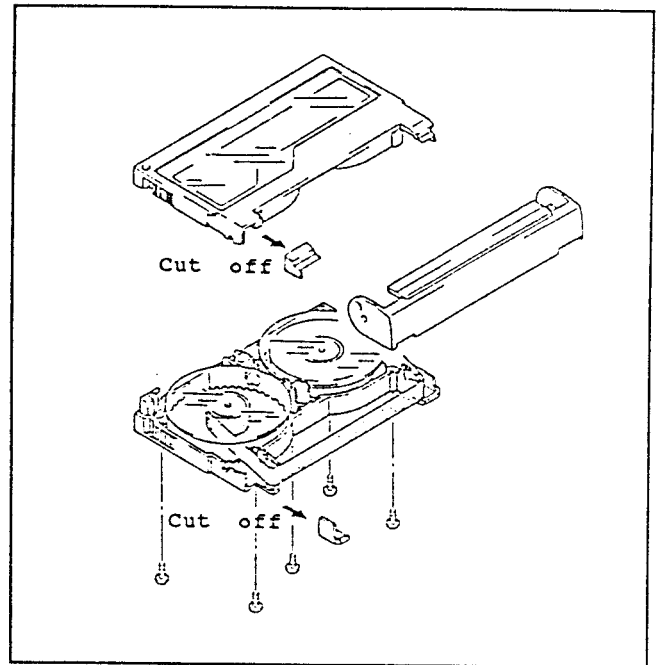


Fig.II-32

##### 4-1 Preparation for Adjustment

\*Caution: 1. Do not turn the tilt adjusting screw of the coaster (Right). Replace it if any adjustments required. The repair parts have been already adjusted.

- (1) Clean the tape running surface.
- (2) Referring to the service manuals for each system, observe the RF envelope signal and RF switching pulse on oscilloscope.
- (3) Playback the Alignment tape for tracking.
- (4) Confirm that the waveform at inlet and outlet sides are flat.  
If not, perform the following adjustments from page 46.

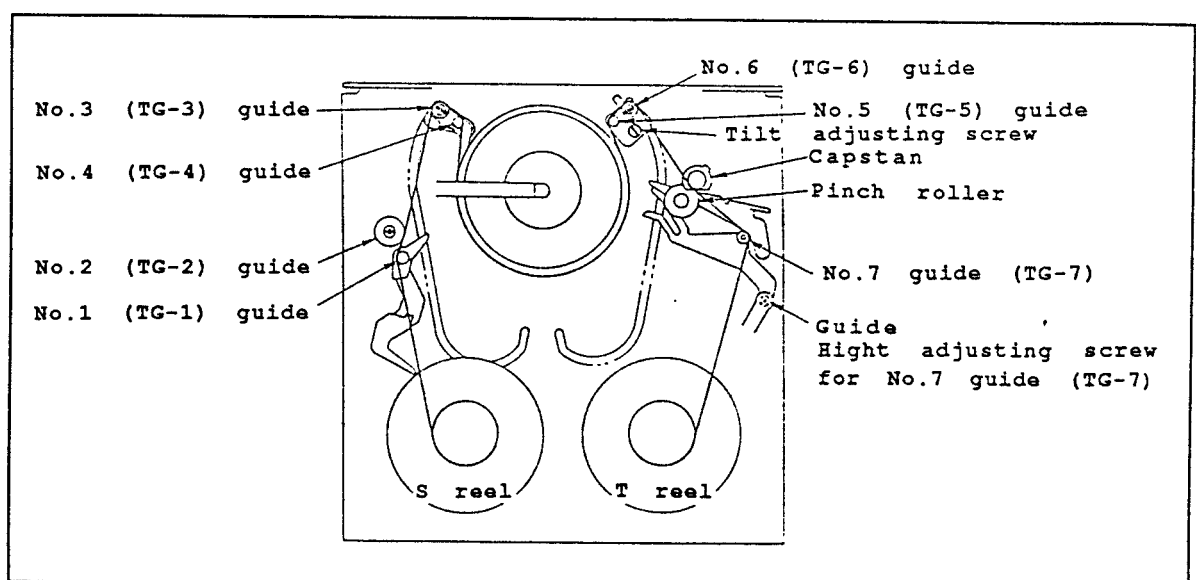


Fig.II-33

#### 4-2 Tracking Adjustment (Fig.II-34)

- (1) Playback Alignment tape for tracking adjustment.
- (2) Loosen the screw ② a little by inserting a hexagonal wrench (0.89mm) or equivalent into the hole ①.  
Then, turn the No.3 guide ③ to make the waveform at inlet side flat.
- (3) Loosen the screw ⑤ a little by inserting a hexagonal wrench (0.89mm) or equivalent into the hole ④.  
Then, turn the No.6 guide ⑥ to make the waveform at outlet side flat.

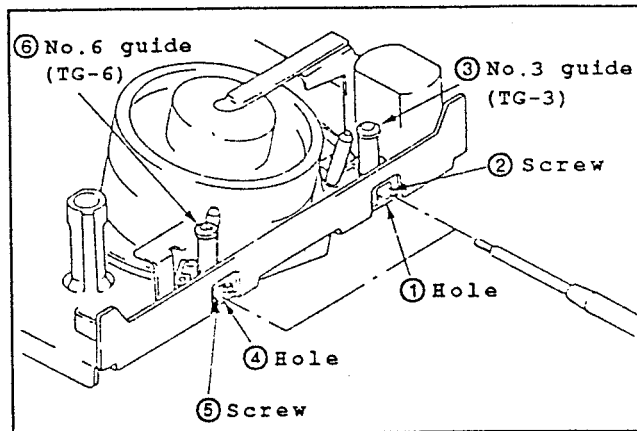


Fig.II-34

\*Note: Be careful not to loosen the screws too much because the guide will be easily moved.

#### 4-3 Tracking Fine Adjustment (Fig.II-35)

- (1) Referring to the service manuals for each system, set it to the track shift made. (70 %)
- (2) Confirm that the waveform is flat. If not, turn No.3 and 6 guides to make it flat.
- (3) Tighten the screw ② of No.3 guide to lock it. At this time, confirm that the inlet side of waveform is not changed. (Fig.II-34)
- (4) Tighten the screw ⑤ of No.6 guide to lock it. At this time, confirm that the outlet side of waveform is not changed. (Fig.II-34)

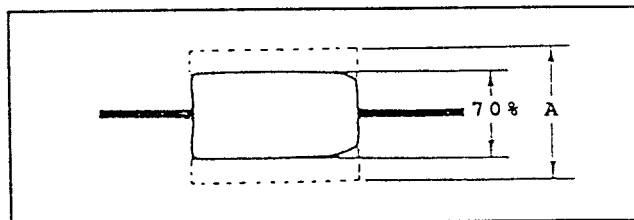


Fig.II-35

\*Note: Torque at Screws ②, ⑤: 200g/cm approx.

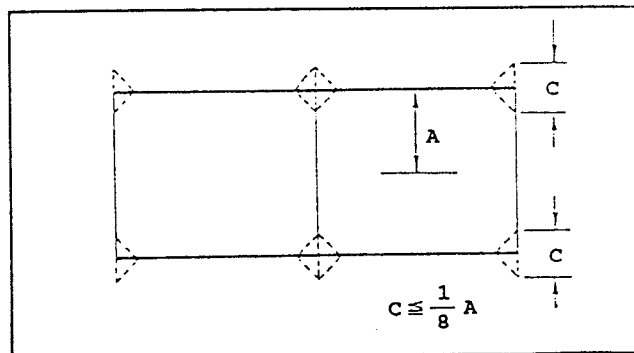


Fig.II-36

#### 4-4 No.2 Guide Adjustment

\*Note: When turning or replacing the No.2 guide, perform the following preset procedures before adjustment.

##### 4-4-1 No.2 Guide Presetting

- To preset, adjust the distance between the surfaces of mechanical chassis and TG2 upper flange ① to 18.6 mm by turning TG2 upper flange ①.

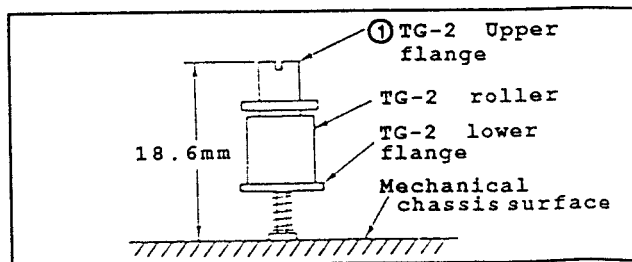


Fig.II-37

#### 4-4-2 No.2 Guide Adjustment (Fig.II-38, 39)

- (1) Playback the tape having 10 $\mu$ m in thickness (P6-120 etc.). Then, set it to REV mode.
- (2) Confirm that the tape is not creased at the lower flange ② of No.2 guide ①. If creased, turn the upper flange ③ of No.2 guide ① clockwise until the crease removed.
- (3) Playback the Alignment tape for tracking adjustment.
- (4) In the same procedures in "4-2" and "4-3", perform the tracking and tracking fine adjustments.
- (5) At track shift mode, playback the tape after CUE/REV mode. Confirm that the RF envelope rises horizontally within 2 sec as shown in Fig.II-40.
- (6) If not, turn the upper flange ③ of No.2 guide ① counter clockwise by 90°. Then, perform the step (5) again.

Repeat the steps (5) and (6) until the normal waveform as specified is obtained.  
When the RF envelope changed at this time, perform the tracking fine adjustment for inlet side. Then, perform the step (5).

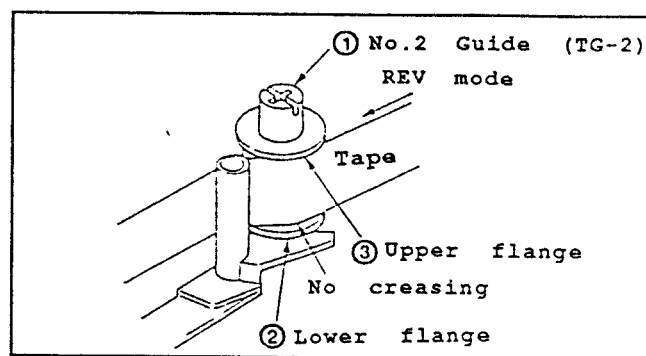


Fig.II-38

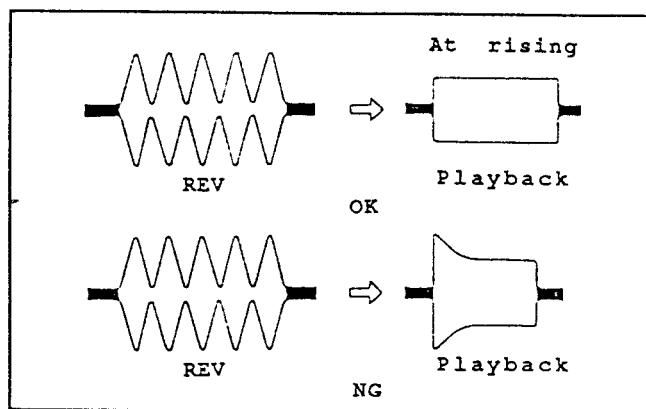


Fig.II-39

#### 4-5 No.7 Guide Adjustment (Fig.II-40)

- (1) Playback the tape having 10 $\mu$ m in thickness (P6-120, etc.). Then, set it to REV mode.
- (2) Confirm that the tape between the No.6 guide ① and the capstan ② is not loosened. If loosened, turn the height adjusting screw ④ of No.7 guide ③ to remove it.
- (3) Set it to PLAY mode. Then, confirm that the tape between the capstan ② and the No.7 guide ③ is not loosened (0.5mm or less).

If not (more than 0.5mm), turn the height adjusting screw ④ of No.7 guide ③ until the rating is obtained.

- (4) Set it to REV mode again. Confirm that the tape loosening between the No.6 guide ① and the capstan ② is 0.3mm or less.

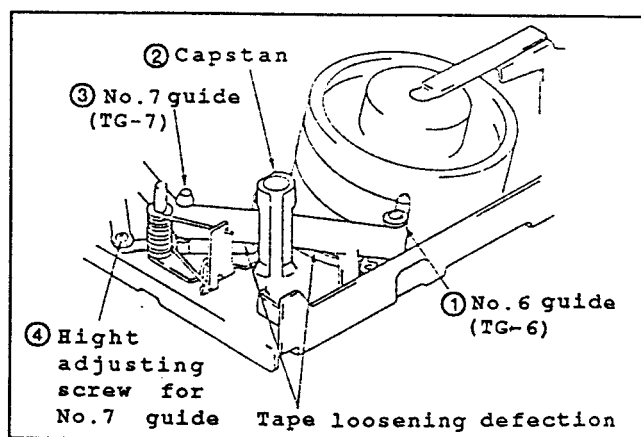


Fig.II-40



#### 4-6 Checks after Adjustments

\*Note: If the following ratings cannot be obtained, perform the tracking, tracking fine, No.2 guide and No.7 guide adjustments, respectively.

##### 4-6-1 Tracking Check (Fig.II-41)

- (1) Set it to the track shift mode. Confirm that the amplitude of RF envelope is 70% approx.
- (2) Confirm that the minimum amplitude (E MIN) is 65% or more of the maximum (E MAX).
- (3) Confirm that the waveform has no variations.

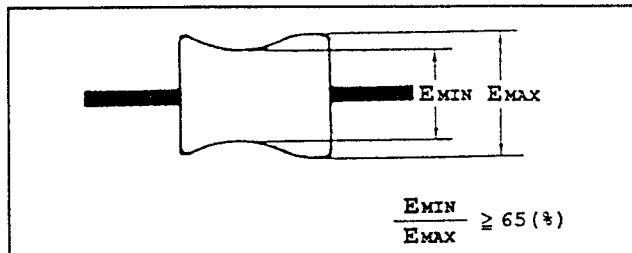


Fig.II-41

##### 4-6-2 CUE/REV Waveform Check (Fig.II-42)

- (1) Playback the alignment tape for tracking adjustment. Then, set it to REV mode. Confirm that the tops between each waveform remains stable and equal within 5 sec.
- (2) Set it to CUE mode. Confirm that the tops between each waveform remains stable and equal for more than 5 sec.

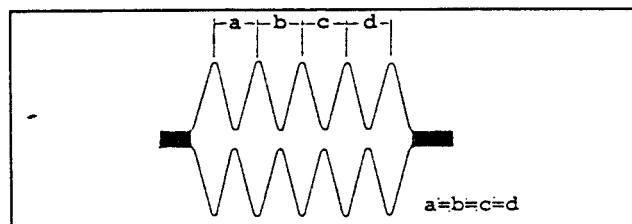


Fig.II-42

##### 4-6-3 Rise Time Check

- (1) Playback the alignment tape for tracking adjustment.
- (2) After ejecting the tape once, playback it again.
- (3) Confirm that the RF envelope rises horizontally within 2 sec. Also, check that the tape is not loosened around the pinch roller.
- (4) After set it to CUE/REV and FF/REW, playback it again. Confirm that the RF envelope rises within 2 sec. horizontally. Also, check that the tape is not loosened around the pinch roller.
- (5) Repeat check procedures from (2) to (4) again.

##### 4-6-4 Tape Movement Check (Fig.II-43)

- (1) Playback the cassette tape having 10μmm in thickness (P6-120 etc.). Confirm that the tape at each guide as indicated in the Fig.II-44 is not deflected or curled. (less than 3mm acceptable).
- (2) Set it from PLAY to CUE. Then, set it from PLAY to REV. Confirm that the tape at each guide is not also deflected or curled. (less than 0.3mm acceptable).

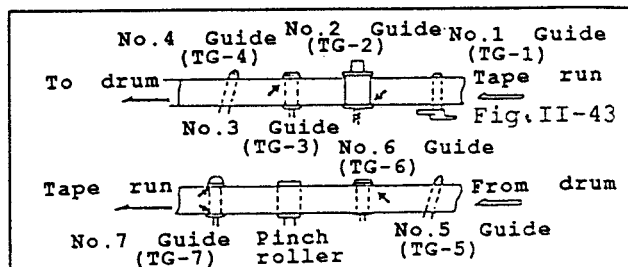


Fig.II-43